South Carolina

Department of Health and Environmental Control

Bureau of Air Quality

Preliminary Determination

For

BP Amoco Chemical Company – Cooper River Plant
Wando, Berkeley County, South Carolina

October 8, 2014

Preliminary Determination

This review was performed by the Bureau of Air Quality of the South Carolina Department of Health and Environmental Control in accordance with South Carolina Regulations for the Prevention of Significant Air Quality Deterioration.

October 8, 2014

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Appendices

I. Time Line (Permitting Action History)

June 21, 2012	Representatives of BP Amoco Chemical Company - Cooper River Plant (BPCR) and TRC Environmental Corporation (TRC) met with the South Carolina Department of Health and Environmental Control Bureau of Air Quality (BAQ) personnel to discuss a proposed expedited Prevention of Significant Deterioration (PSD) construction permit application for a major plant modernization/debottleneck project.
March 20, 2013	Representatives of BPCR and TRC met with SCDHEC personnel for a second time to discuss the draft expedited PSD construction permit application, and how does the addition of two new cooling tower cells relate to the propose PSD project.
April 11, 2013	TRC, on behalf of BPCR, submitted an expedited PSD construction permit application to SCDHEC proposing to modernize and debottleneck the plant at BPCR located in Wando, South Carolina.
April 18, 2013	SCDHEC notified BPCR and TRC via email and phone that SCDHEC accepted the PSD construction permit application into the expedited program.
April 19, 2013	Engineering Services of BAQ e-mailed a copy of the application to Catherine Collins (US Fish and Wildlife Services) and Heather Ceron (US EPA – Region IV) and informed them that BAQ had deemed the application complete.
April 22, 2013	BAQ Permitting issues letter to BPCR to request additional information and clarify items in the application. Facility was given a May 6, 2013 deadline to provide requested information.
April 26, 2013	Tracy Price of SCDHEC sends email to BPCR to request additional information and clarify items regarding the modeling portions of the application.
April 26, 2013	BPCR sent email to James Robinson and Tracy Price requesting a meeting to discuss the information requested by SCDHEC.
May 2, 2013	BPCR and TRC met with SCDHEC at 2600 Bull St., Conference Room 2290, to discuss the information requested by SCDHEC.
May 8, 2013	TRC, on behalf of BPCR, submitted the information as requested by SCDHEC on April 26, 2013.
May 9, 2013	Air Quality Modeling Section (Modeling) sent email to BPCR and TRC requesting additional information on modeling items.

May 9, 2013	TRC, on behalf of BPCR, emailed additional information as requested by Modeling on May 9, 2013.
May 13, 2013	TRC, on behalf of BPCR, submitted additional information as requested by SCDHEC (James Robinson) on April 26, 2013.
May 15, 2013	Modeling sent email to BPCR and TRC requesting additional information and clarification on modeling items.
May 21, 2013	TRC, on behalf of BPCR, emailed additional information as requested by SCDHEC Modeling on May 15, 2013.
May 21, 2013	Brent Pace of BPCR and James Robinson of SCDHEC discussed PSD project updates via phone call.
June 6, 2013	SCDHEC personnel held conference call with BPCR and TRC to discuss PSD netting analysis. BAQ requested that BPCR submit a proper netting analysis of PSD project.
June 12, 2013	SCDHEC personnel held conference call with BPCR and TRC to discuss additional information (control device descriptions, more detailed process and proposed changes descriptions, detail discussion synthetic minor/PSD avoidance limits, reduction in VOC emissions in Wastewater Treatment Area) needed for the PSD application.
June 12, 2013	SCDHEC personnel held conference call with EPA personnel (Katie Lusky) to discuss PSD netting analysis for BPCR PSD project.
June 14, 2013	Brent Pace of BPCR and James Robinson of SCDHEC held follow up phone call for clarification on June 12, 2013 phone call.
June 18, 2013	BAQ Permitting sent email to BPCR and TRC requesting additional information on PSD netting analysis, significant emissions increases, and other items needed for the Preliminary Determination.
June 20, 2013	Brent Pace of BPCR and James Robinson of SCDHEC discussed PSD project updates via phone call.
June 25, 2013	James Robinson held conference call with BPCR and TRC to discuss additional information on PSD netting analysis, significant emissions increases, and other items needed for the Preliminary Determination. BPCR proposes to submit a revised PSD application.
June 26, 2013	Brent Pace of BPCR and James Robinson of SCDHEC held follow up phone call for clarification on June 25, 2013 phone call.
July 2, 2013	Brent Pace of BPCR requested a one week extension to submit a

	revised application, to July 12, 2013. James Robinson of SCDHEC granted one week extension.
July 10, 2013	Brent Pace of BPCR and James Robinson of SCDHEC discussed clarification of PSD emissions calculations via phone call. Mr. Pace requested an additional one week extension to submit a revised application, to July 19, 2013. Mr. Robinson of SCDHEC granted additional one week extension.
July 19, 2013	Brent Pace of BPCR and James Robinson of SCDHEC discussed PSD updates. Mr. Pace requested an additional two week extension to submit a revised application, to August 2, 2013. Mr. Robinson of SCDHEC granted additional two week extension.
August 2, 2013	Brent Pace of BPCR and James Robinson of SCDHEC discussed PSD updates. Mr. Pace requested to put project on hold for at least three weeks, in order to decide next steps forward. Mr. Robinson of SCDHEC acknowledged hold request.
September 7, 2013	After a few email exchanges between August 2, 2013 and September 7, 2013 discussing the status of revised application, Brent Pace of BPCR and James Robinson of SCDHEC agreed that Brent Pace will notify James Robinson when BPCR is close to submitting a revised application.
December 17, 2013	Brent Pace of BPCR emailed James Robinson of SCDHEC some pages of the draft revised application to review.
January 10, 2014	James Robinson of SCDHEC emailed comments on pages of draft revised application to Brent Pace of BPCR.
January 20, 2014	Brent Pace of BPCR emailed James Robinson of SCDHEC responses to comments.
January 24, 2014	Brent Pace of BPCR and James Robinson of SCDHEC discussed responses to comments on pages of draft revised application.
March 11, 2014	TRC, on behalf of BPCR, submitted a revised expedited PSD construction permit application to SCDHEC.
March 14, 2014	James Robinson of SCDHEC emailed Natasha Hazziez of EPA Region 4 an electronic copy of the revised PSD application.
March 17, 2014	James Robinson of SCDHEC emailed Brent Pace of BPCR to request additional information and clarify items in the revised application.
April 3, 2014	Brent Pace of BPCR and James Robinson of SCDHEC discussed March 17, 2014 request for additional information to clarify items in the revised application.

April 9, 2014	Brent Pace of BPCR emailed James Robinson of SCDHEC some responses to March 17, 2014 request. BPCR need to send updates and replacement pages to the revised application.
April 14, 2014	James Robinson of SCDHEC emailed Natasha Hazziez of EPA Region 4 additional information for revised PSD application.
May 8, 2014	Natasha Hazziez of EPA Region 4 and James Robinson of SCDHEC discussed BPCR emissions calculations via phone call.
May 21, 2014	Brent Pace of BPCR emailed James Robinson of SCDHEC updated information on removal of synthetic minor limits.
May 23, 2014	Brent Pace of BPCR emailed James Robinson of SCDHEC updated emissions spreadsheets.
May 30, 2014	Brent Pace of BPCR emailed James Robinson of SCDHEC updated emissions spreadsheets.
June 4, 2014	SCDHEC personnel held conference call with BPCR and TRC to discuss emissions calculations, synthetic minor limit removal, BACT limits, and other PSD items.
June 9, 2014	Brent Pace of BPCR emailed James Robinson of SCDHEC updated emissions spreadsheets.
June 11, 2014	Brent Pace of BPCR and James Robinson of SCDHEC discussed removal of synthetic minor limits and BACT limits.
June 17, 2014	Brent Pace of BPCR sent an email to James Robinson of SCDHEC discussing BACT limits, synthetic minor limits, and additional equipment needing BACT.
June 20, 2014	SCDHEC personnel held conference call with BPCR and TRC to discuss BACT short-term limits, synthetic minor/PSD avoidance limits, and other items pertaining to the revised PSD application.
June 25, 2014	SCDHEC personnel held conference call with BPCR and TRC to discuss BACT analysis.
July 2, 2014	SCDHEC personnel held conference call with BPCR and TRC to discuss BACT analysis.
July 10, 2014	SCDHEC personnel held conference call with BPCR and TRC to discuss BACT analysis.
July 16, 2014	SCDHEC personnel held conference call with Brent Pace of BPCR to discuss BACT analysis.
July 23, 2014	Brent Pace of BPCR and James Robinson of SCDHEC discussed BACT analysis.

July 29, 2014	James Robinson of SCDHEC emailed Brent Pace of BPCR a list of discussion items on the BACT analysis.
July 29, 2014	Brent Pace of BPCR sent an email to James Robinson of SCDHEC responses to BACT analysis discussion items.
August 7, 2014	SCDHEC personnel held conference call with BPCR and TRC to discuss BACT analysis.
August 12, 2014	TRC, on behalf of BPCR, submitted a second revised expedited PSD construction permit application to SCDHEC.
August 20, 2014	Brent Pace of BPCR and SCDHEC personnel discussed PSD application questions and potential affects of temporary compressors on BACT analysis.
August 27, 2014	Brent Pace of BPCR and James Robinson of SCDHEC briefly discussed modeling changes and control technology search.
August 29, 2014	James Robinson of SCDHEC emailed Brent Pace of BPCR a draft of the preliminary determination (PD) for comments.
September 5, 2014	Brent Pace of BPCR emailed James Robinson of SCDHEC comments on draft PD.
September 9, 2014	SCDHEC personnel held conference call with BPCR and TRC to discuss draft preliminary determination.
September 10, 2014	James Robinson of SCDHEC emailed Brent Pace of BPCR a draft of the statement of basis (SOB).
September 11, 2014	SCDHEC personnel held conference call with BPCR to discuss draft preliminary determination.
September 12, 2014	Brent Pace of BPCR emailed James Robinson of SCDHEC additional comments on draft PD.
September 12, 2014	Brent Pace of BPCR emailed James Robinson of SCDHEC comments on draft SOB.
September 24, 2014	James Robinson of SCDHEC emailed Brent Pace of BPCR a draft of the PSD permit.
September 25, 2014	Brent Pace of BPCR emailed James Robinson of SCDHEC comments on draft PSD permit.
September 25, 2014	SCDHEC personnel held conference call with BPCR and TRC to discuss draft PSD permit.
September 26, 2014	James Robinson of SCDHEC emailed Brent Pace of BPCR a draft

	of the PSD permit, SOB, and PD.
September 30, 2014	Brent Pace of BPCR emailed James Robinson of SCDHEC comments on draft PSD permit, SOB, and PD.
October 1, 2014	James Robinson of SCDHEC emailed Brent Pace of BPCR an updated draft of the PSD permit, SOB, and PD.
October 8, 2014	The BAQ placed the PSD Preliminary Determination and PSD Construction Permit No. 0420-0029-CU on public notice for a thirty-(30) day comment period by publication in *The Post & Courier* newspaper in Charleston, South Carolina. All appropriate Federal and State Officials were notified.

II. Introduction and Preliminary Determination

A. Project Overview

BP Amoco Chemical Company – Cooper River Plant (BPCR) submitted a Prevention of Significant Deterioration (PSD) construction permit application to the South Carolina Department of Health and Environmental Control (SCDHEC), Bureau of Air Quality (BAQ), to modify the #1 and #2 Oxidation (OX) Units to remove limitations that prevent the units from operating at their unit design capacities (debottlenecking); and to make minor modifications to the #1 and #2 PTA Units to reduce operating costs. In general, these modifications will include improvements to the reaction environment, additional reaction air capacity, optimization of the recovery systems, improved Dehydration Tower (DHT) operation, improved energy recovery, removal of several emission points, addition of dense phase conveying and additional cooling tower capacity. These changes will result in increased actual hourly production and emissions rates, but will not increase maximum production rates or potential emission rates. This project is referred to as the OX Modernization/Debottleneck project.

The specific equipment revisions, additions, and removals included in the proposed project are as follows:

1. #1 OX unit
   - Replacement of the four existing reactors (BR-301 A-D) with a new single more efficient reactor (BR-301)
   - Replacement of the reactor overhead condenser system
   - Replacement of the air compressor rotor to reduce energy consumption
   - Direct injection of Paraxylene (PX) to the new reactor
   - Additional reactor overhead recovery capacity by replacing equipment with an improved design
   - Routing of 1st crystallizer (BD-401) vent to reactor off-gas recovery system
   - Maintain power recovery in off-gas expander by lowering upstream pressure drop
   - Conversion of dehydration tower (DHT) to azeotropic distillation unit
   - Change DHT overhead recovery system to a two-stage system by:
     - Converting existing DHT Scrubber (BT-702) to a one-stage acid scrubber
     - Routing the DHT Scrubber vent to the Low Pressure Absorber (LPA) (BT-603)
     - Revising the packing in the LPA
   - Change High Pressure Absorber (T-401) internal packing
   - Addition of dense phase conveying (conveyance of solids with less carrier gas)
   - Additional capacity for filters
   - Removal of the low pressure vent gas treatment (LPVGT) compressor (BC-710)
   - Removal of the solvent stripper (BT-605)
   - Removal of the residue evaporator (BM-606) and catalyst recovery unit (BD-625/631/632/BE-645)
   - Removal of the PX Stripper (BT-740)
   - Addition of a steam turbine to generate power from excess low pressure steam

- Addition of a 82,000 gallon fixed roof NBA storage tank (size subject to change when BPCR goes through installation process)
- Replacement of existing Emergency Generator (BM-1201) with a new one
- Addition of a new Emergency Generator (BM-1204)

2. #1 PTA unit
   - Revisions to crystallizer vent scrubber (CVS) (CM-301) to improve energy recovery
   - Addition of a 5th crystallizer (CD-300)
   - Addition of dense phase conveying
   - Replacement of dryer (CM-403B)

3. #2 OX unit
   - Direct injection of PX to reactor
   - Re-rating (Modification) of air compressor for additional capacity
   - Replacement of reactor overhead condenser
   - Conversion of dehydration tower (DHT) (DT-403) to an azeotropic distillation unit
   - Modification of packing or trays in DHT (DT-403), High Pressure Absorber (HPA) (DT-111), LPA (DT-302), Dryer Scrubber (DT-301) and High Pressure Vent Gas Treatment System (HPVGTS) Scrubber (DT-1821)
   - Routing of DHT (DT-403) vent to LPA system (DT-302)
   - Addition of dense phase conveying
   - Removal of Low Pressure Vent Gas Treatment (LPVGT) System compressor (DC-304)
   - Removal of solvent stripper (DT-402) system
   - Removal of the residue evaporator (DM-403) and catalyst recovery unit (DD-412/413/414/DE-416)
   - Removal of PX Stripper (DT-404)
   - Addition of a steam turbine to generate power from excess steam
   - Addition of a 75,000 gallon fixed roof NBA storage tank (size subject to change when BPCR goes through installation process)

4. #2 PTA Unit
   - Modifications to CVS (DM-601) to improve energy recovery
   - Modification of piping system from PTA Feed Drum (DD-500) to the Sundyne pumps
   - Addition of a 4th Sundyne pump
   - Addition of dense phase conveying
   - Replacement of dryer (DM-703)

5. Cooling Towers
   - Additional #1 Cooling Tower capacity
   - Additional #2 Cooling Tower capacity

The project will also include smaller items that will occur on all the units in the following general categories:

1. Additional and/or improved automation, multivariable control schemes, and on-line analyzers to increase unit reliability and improve process control.
2. Replacement of process equipment and piping that are negatively impacting maintenance costs and unit reliability.
3. Replacement of obsolete or end-of-life equipment such as piping, instruments, and computer equipment, where replacement parts are no longer available and equipment that has been determined to be too worn or corroded.
4. Replacement of exchangers and vessels to improve metallurgy, reduce corrosion, and reduce maintenance costs.

As part of this project, BPCR is removing synthetic minor PSD avoidance limits that were established in construction permits 0420-0029-CF, -CJ, -CP, and -CR for the following emission points: #1 OX DHT Scrubber, #1 and #2 OX LPA's, #1 and #2 OX HPVGTS, #2 PTA Crystallizer Vent Scrubber (CVS), #2 OX HPVGTS Heater, and the combined limit for CR#1 and CR#2 Plants. The table below lists the individual synthetic minor limits that will be removed. These emission points have been included in the BACT analysis.

Synthetic Minor Limits To Be Removed						
OP ID	**CP ID(s)**	**Process/Equipment (Equipment ID)**	**Pollutant**	**Emission Limitation (lb/hr)**	**Emission Limitation (TPY)**	**Proposed BACT Limit (lb/hr)**
03	CP & CR	#1 OX LPA (BT-603)	VOC	40	80	9.60
03	CR	#1 OX LPA (BT-603)	CO	N/A	40	4.10
03	CP & CR	#1 OX DHT Scrubber (BT-702)	VOC	60	165	N/A(1)
03	CR	#1 OX DHT Scrubber (BT-702)	CO	N/A	380	
03	CJ & CR	#1 OX HPVGTS (HPA (BT-401))	VOC	85	80	4.70
03	CJ & CR	#1 OX HPVGTS (HPA (BT-401))	CO	1452	375	87.9
05	CF(2)	#2 OX LPA (DT-302)	VOC	15.57	N/A	8.85
		#2 OX HPVGTS (HPA (DT-111))				3.50
05	CF(2)	#2 PTA Unit CVS (DM-601)	VOC	25.6	N/A	20.0
05	CF(2)	#2 OX Fugitives	VOC	3.5	N/A	HON LDAR
05	CF(2)	#2 OX HPVGTS Fired Heater	VOC	0.84	N/A	0.0055 lb/MM BTU
03-06	CP	Combined total for CR#1 & CR#2	VOC	N/A	1825	Replaced with individual vent limits

(1) The #1 OX DHT Scrubber will no longer vent to the atmosphere and is being routed to the #1 OX LPA. The #1 OX LPA BACT limit accounts for the #1 OX DHT Scrubber emissions.

(2) Construction Permit 0420-0029-CF established a total PSD avoidance limit of 49.26 lb VOC/hr for the Cooper River #2 Plant. This limit consisted of these four sources of emissions, and the following sources of emissions: Incremental increase from the Tank Farm (0.02 lb/hr) and Wastewater Fugitives (3.11 lb/hr), the Anaerobic Reactor (0.31 lb/hr), and the CO_2 Stripper (0.35 lb/hr). A revised PSD avoidance SM limit established through construction permit 0420-0029 will be the sum of the emissions from the Tank Farm, Wastewater Fugitives, Anaerobic Reactor, and CO_2 Stripper (3.79 lb/hr).

Due to emissions increases associated with this proposal, the project is subject to S.C. Regulation 61-62.5, Standard No. 7, "Prevention of Significant Deterioration (PSD)". This regulation is equivalent to the Federal Prevention of Significant Deterioration of Air Quality regulations in Title

40 Code of Federal Regulations (CFR) Section 52.21. Pursuant to these regulations, new major stationary sources and modifications to major stationary sources of air pollution must demonstrate that they will not significantly deteriorate the air quality in their region. BPCR has potential emissions of VOC and CO, which exceed the significance levels allowed in this regulation. The PSD review was conducted for VOC and CO and includes a Best Available Control Technology (BACT) determination and Ambient Air Impact Analyses.

B. Regulatory Applicability

The increased production capacity results in potential emissions that exceed the PSD significant thresholds. By virtue of the proposed increase, this project is subject to review under the following standards in S.C. Regulation 61-62 and Federal standards:

- SC Regulation 61-62.5, Standard No. 2 "Ambient Air Quality Standards"
- SC Regulation 61-62.5, Standard No. 3 "Waste Combustion and Reduction"
- SCC Regulation 61-62.5, Standard No. 4 "Emissions from Process Industries"
- SC Regulation 61-62.5, Standard No. 7 "Prevention of Significant Deterioration"
- SC Regulation 61-62.60 "South Carolina Designated Facility Plan and New Source Performance Standards"
- SC Regulation 61-62.61 "National Emission Standards for Hazardous Air Pollutants (NESHAPs)"
- S.C. Regulation 61-62.63 "NESHAPs for Source Categories"
- 40 CFR 60, Subpart A "Standards of Performance for New Stationary Sources - General Provisions"
- 40 CFR 60, Subpart Db "Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units"
- 40 CFR 60, Subpart VV "Standard of Performance for Equipment Leaks of VOC in Synthetic Organic Chemical Manufacturing Industry (SOCMI) for which Construction, Reconstruction, or Modification Commenced After January 5, 1981, and on or Before November 7, 2006"
- 40 CFR 60, Subpart VVa "Standard of Performance for Equipment Leaks of VOC in Synthetic Organic Chemical Manufacturing Industry (SOCMI) for which Construction, Reconstruction, or Modification Commenced After November 7, 2006"
- 40 CFR 60, Subpart III "Standard of Performance for VOC Emissions from SOCMI Air Oxidation Unit Processes"
- 40 CFR 60, Subpart NNN "NSPS for VOC Emissions from SOCMI Distillation Operations"
- 40 CFR 60, Subpart IIII "NSPS for Stationary Compression Ignition Internal Combustion Engines"
- 40 CFR 61, Subpart FF "National Emission Standards for Benzene Waste Operations"
- 40 CFR 63, Subpart A "General Provisions"
- 40 CFR 63, Subpart F "National Emission Standards for Organic Hazardous Air Pollutants (NESHAPs) from the SOCMI"
- 40 CFR 63, Subpart G "NESHAPs From the SOCMI Process Vents, Storage Vessels, Transfer Operations, and Wastewater"
- 40 CFR 63, Subpart H "NESHAPs for Equipment Leaks"
- 40 CFR 63, Subpart ZZZZ "National Emission Standards for Hazardous Air Pollutants

(NESHAPs) for Stationary Reciprocating Internal Combustion Engines (RICE)"

- 40 CFR 63, Subpart DDDDD "NESHAPs for Industrial, Commercial, and Institutional Boilers and Process Heaters"
- 40 CFR Part 64 "Compliance Assurance Monitoring (CAM)"

III. Detailed Process Description

BPCR is a chemical manufacturing facility located in Wando, South Carolina that produces purified terephthalic acid (PTA). PTA is a white, inert powder used to make polyester fibers, bottles, and films. The major raw materials in the production of PTA are Paraxylene (PX), acetic acid, caustic soda, and hydrogen. Plant operation consists mainly of: 1) utilities 2) production of crude TA, 3) purification into PTA, 4) product loading/shipping, and 5) waste treatment along with some additional areas at the plant. There are two units that manufacture PTA: Cooper River #1 (CR#1), which consists of the #1 Oxidation (OX) Unit and the #1 PTA Unit; and Cooper River #2 (CR#2), which consists of the #2 Oxidation (OX) Unit and the #2 PTA Unit. The #1 and #2 OX Units produce crude TA and the #1 and #2 PTA Units purify the crude TA, to make PTA.

#1 & #2 Oxidation Units

In each Oxidation (OX) unit, a BPCR proprietary process is used for the catalytic liquid phase air oxidation of paraxylene (PX) to produce crude terephthalic acid (TA). Acetic acid (HAC) and catalyst solution are mixed in a feed mix drum. The feed mix from the drum, PX (by direct injection), and air from the process air compressors are continuously fed to the reactors. Exothermic heat from the reaction is removed by flashing off, and then condensing the boiling reaction solvent. A portion of this condensate is withdrawn to control the water concentration in the reactor and the remainder is refluxed back to the reactor.

Reactor effluent is depressurized and cooled to filtering conditions in a series of crystallizers. Air is fed to the first crystallizer for additional reaction. The crystallizer temperatures are controlled by allowing a portion of the reaction solvent to flash off. The crystallizer vent streams are sent to the dehydration tower (DHT) or the high pressure absorber (HPA) for recovery of valuable materials. The DHT also removes water formed in the reaction. The DHT is an azeotropic distillation system where the vent streams from the system are sent thru two-stage scrubbing. This two-stage scrubbing recovers PX and HAC before being vented to the atmosphere through the LPA. The excess reaction water removed by the DHT system is sent to wastewater treatment. The crystallizer precipitate, TA, is recovered by filtration and finally dried. The dried TA solids are conveyed to the OX intermediate storage silos (TA silos) and stored for additional processing in the PTA unit.

The off-gas from the OX reactors is sent through a recovery device, the HPA, before being sent to a control device, the high pressure vent gas treatment system (HPVGTS) in which CO, VOC, and HAP are nearly totally destroyed and emitted to the atmosphere. The HPVGTS reactor contains catalyst bricks that are routinely changed out based on their activity and mechanical condition. Further processing in the OX unit is required to recover and purify HAC from the reactor outlet, crystallizer solvent withdrawal streams, and also from the un-recycled mother liquor stream.

#1 & #2 Purified Terephthalic Acid Units

The purified terephthalic acid (PTA) unit is also a continuous operation. Crude terephthalic acid

(TA) is fed from the TA silos to the feed slurry drum to produce a slurry of TA crystals and water. The slurry is heated to dissolve the TA and then the slurry enters the hydrogenation reactor where it reacts to convert the impurities into a form that can be separated from the product. The PTA reactor catalyst is routinely changed out based on its activity and mechanical condition. After reaction, the solution goes through a cycle of lowering the pressure and cooling to crystallize the PTA. A portion of the aromatic acids in the mother liquor are recovered by cooling and filtering the mother liquor; the aromatic acids are recycled back to the OX reaction unit.

The crystallized PTA is recovered from the mother liquor by separation in the filtration section of the unit. The final product is dried and transferred to the PTA day silos and then to the PTA product storage silos.

Product Loading and Shipping
The PTA storage system is comprised of six large silos that are used to manage product transfers, packaging, loading and shipping. Shipping personnel package the product from the large silos into various containers and ship it to the customers.

IV. Significant Emission Rates

As shown in Table IV-1, this project exceeds the significant threshold as defined under PSD for CO and VOC emissions. Emissions calculations for the modified units were based on actual-to-potential test to determine if there was a significant emissions increase.

Table IV-1. PSD Applicability Analysis

Pollutant	Controlled Emissions Increase TPY	PSD Significant Threshold TPY	Significant Increase?
PM	7.0	25	No
PM_{10}	6.6	15	No
$PM_{2.5}$	5.8	10	No
SO_2	0.2	40	No
NO_X	27.8	40	No
CO	644.8	100	Yes
VOC	200.3	40	Yes
CO_2e	17,300	75,000	No

V. Best Available Control Technology (BACT) Determination

A. BACT Requirement

BACT is defined as “an emissions limitation (including a visible emission standard) based on the maximum degree of reduction for each pollutant, taking into account energy, environmental, and economic impacts.” As per S.C. Regulation 61-62.5, Standard No. 7, the BACT requirement applies to each individual new or modified affected emissions unit and pollutant emitting activity at which a net emissions increase would occur. In no case can the application of BACT result in emissions of any pollutant which would exceed emissions allowed under any applicable standard under 40 CFR 60 *New Source Performance Standard (NSPS)*, 61 *NESHAP* or 63 *NESHAP for Source Categories*.

Chapter B of the draft *New Source Review Workshop Manual* (October 1990) defines the BACT determination process as a 5-step process.

Step 1 – Identify All Control Technologies
Step 2 – Eliminate Technically Infeasible Options
Step 3 – Rank Remaining Control Technologies by Control Effectiveness
Step 4 – Evaluate Most Effective Controls and Document Results
Step 5 – Select BACT

Opacity is not considered to be a PSD pollutant and therefore, opacity itself does not require a BACT evaluation and establishment of a BACT limit. However, BACT can include the use of visible emission limitations or work practice standards for regulated PSD pollutants. Opacity limits have been included in the draft permit as required by State and Federal regulations. BACT cannot be less stringent than an applicable NSPS or NESHAP as outlined in 40 CFR 60, 61, and 63.

The primary resource for establishing BACT is the RACT/BACT/LAER Clearinghouse (RBLC) on the Technology Transfer Network (TTN) maintained by the EPA. To establish BACT for a PSD source, state regulatory agencies query the RBLC. This database contains information about available control technologies for specific industry sources and lists the limits that other pollution control agencies have established for similar source types.

BAQ queried the RBLC for all similar process types and NSR applicable pollutants. An RBLC advanced search was queried using a standard industrial classification (SIC) code of 2869. In addition to the RBLC, the following sources were reviewed: EPA Control Technology documents (i.e. Air Pollution Control Technology Fact Sheets), NSPS and NESHAP regulations for SOCMI processes, South Coast Air Quality Management District BACT, the California Air Resources Board BACT Clearinghouse, an internet search for similar facilities, a general internet search for VOC and CO emission controls, and operating permits for existing facilities with similar processes.

BPCR queried the RBLC using process types 64.000, 64.003 and 64.999, SOCMI production, process vents, and organic chemical production. Other resources of control technology reviewed were the *EPA Air Pollution Control Technology Fact Sheets*, *EPA Air Pollution Control Cost Manual Sixth Edition* (EPA/452/B-02-001, January 2002), and the applicable NSPS and NESHAP standards. BPCR's queries did not find any control technologies that apply directly to the purified terephthalic acid (PTA) manufacturing process. BPCR also looked at sister facilities located internationally, and found that the conventional control technologies used are the same used at this facility. The sister facilities with new/modern technologies are not compatible and are not feasible to add to the conventional technology. BPCR does not have any data on control technologies for PTA facilities not owned by or joint venture with BP Amoco.

The following control technologies were found to reduce VOC and/or CO emissions. These control technologies will be used throughout the BACT Determination, but the descriptions will not be repeated for each determination.

- **Thermal Oxidizer (TO) –**A TO is a control technology that uses high temperature combustion to control gaseous pollutants, such as VOCs, HAPs and CO. Fuel and air are added to a combustion chamber through which the exhaust gases pass to maintain a high minimum operating temperature, usually 1200 – 1700 °F, and combusts the VOC into carbon dioxide (CO_2) and water (H_2O). This technology typically has a control efficiency of 99+ percent for VOCs and 95+ percent for CO.
- **Regenerative Thermal Oxidizer (RTO) –** An RTO is a control technology that is similar to a TO in the manner it controls gaseous pollutant emissions. The difference between an RTO and a TO is the increased energy efficiency an RTO achieves. This efficiency is attained by storing heat from hot exhaust gases in ceramic media as the process stream enters and exits the combustion chamber. The cooler inlet process stream then recovers the heat from the ceramic media. This technology typically has a control efficiency of 95 to 99 percent for VOCs and 98+ percent for CO.
- **Recuperative Thermal Oxidizer (RCO) –** An RCO is a control technology that is similar to a TO in the manner it controls gaseous pollutant emissions. The difference between an RCO and a TO is the increased energy efficiency that an RCO achieves. This is achieved by adding a primary and/or secondary heat exchanger within the system, where the heat exchanger(s) preheat(s) the incoming vent stream by recuperating heat from the exiting treated exhaust stream. This technology typically has a control efficiency of 90 to 99 percent for VOCs and 98+ percent for CO.
- **Catalytic Thermal Oxidizer (CTO) –** A CTO is a control technology that oxidizes (combusts) gaseous pollutants at temperatures several hundred degrees lower than a TO, RTO, and RCO (typically 500 - 1,000 °F). This is achieved by using a precious-metal catalyst, usually in the form of a bed. A catalyst is a substance used to accelerate the rate of a chemical reaction (combustion), allowing the reaction (combustion) to occur at a much lower temperature. The lower temperatures reduce the amount of supplemental heat required for the process. This technology typically has a control efficiency of 95+ percent for VOCs and 95+ percent for CO.
- **Absorber/Wet Scrubber –** An absorber/wet scrubber is a control technology that removes particulate and/or gaseous pollutants from industrial exhaust streams via contact of contaminants with a liquid absorbing/scrubbing solution. The process uses rapid gas absorption into the scrubbing solution to remove the contaminants. The solution is usually water, or it can be other liquids that specifically target certain compounds. Typically gas enters the bottom of the absorber and passes upward through the scrubbing solution that is sprayed into the top of the scrubber. The scrubbed gas then goes through a mist eliminator where entrained liquid droplets are removed before exhausting to the atmosphere. The scrubber solution is collected in the bottom of the tower where most of the scrubbing solution is recycled to the top of the tower. This technology typically has a control efficiency of 90+ percent for VOCs, but does not control CO.
- **Adsorber –** An adsorber is a control technology that removes pollutants by adhesion to a high surface solid material (adsorbent), such as activated carbon. An adsorber can be used to capture gas or liquid contaminants. The adsorbed material can then be desorbed, removed by heat or vacuum, and reused. This technology typically has a control efficiency of 98 percent for VOCs, but does not control CO.

- **Condenser –** A condenser is a control technology that removes a pollutant by converting the pollutant from a gas to a liquid. This can be done by either cooling, or increasing the pressure of the gas. The condensed liquid can be recovered or recycled. Often, condensers are heat exchangers, having various designs and sizes. This technology typically has a control efficiency of 50 - 90 percent depending on the concentration of VOC compounds present in the gas stream, but does not control CO emissions.
- **Flare –** A gas flare, also known as a flare stack, is a control technology that uses a high temperature (up to 2000 °F) open air flame to burn off flammable gases such as VOCs. The vent stream being combusted must have a heating value greater than 300 British thermal units/standard cubic feet (Btu/scf) to maintain combustion, or a supplemental fuel must be added to meet the minimum of 300 Btu/scf. The control requirements in 40 CFR 60.18 states a flare shall only be used as a control device if the vent stream being combusted has a net heating value of at least 200 Btu/scf. to prevent blowing out the flare flame. This technology typically has a control efficiency of 95+ percent for VOCs. A flare is not a good option to use for control of CO emissions because it can produce as much CO as it controls.
- **Boiler –** A boiler is an enclosed device using controlled flame combustion and having the primary purpose of recovering thermal energy in the form of steam or hot water. Controlled flame combustion refers to a steady-state, or near steady-state, process wherein fuel and/or oxidizer feed rates are controlled. A boiler can be used a control device where waste gas streams are fed directly into the boiler flame, essentially operating as thermal oxidizer. This technology typically has a control efficiency of 99+ percent for VOCs and 95+ percent for CO.
- **Biofiltration –** Biofiltration is a control technology that uses living material (microorganisms) to metabolize or breakdown organic pollutants in contaminated air streams. The contaminated air stream is slowly pumped through a packed bed or other filter media, and pollutants are absorbed into a thin layer of moisture, called biofilm, surrounding the particles that make up the filter media. Biological degradation of pollutants occurs in this biofilm, resulting in the byproducts of CO_2 and H_2O. Biofilters are very sensitive to temperature and moisture content, and work best with low VOC concentrations (<1,000 ppm). This technology typically has a control efficiency of 90+ percent for VOCs, but does not control CO.
- **Good Combustion Practices –** Good combustion practices are methods used to maintain combustion equipment (such as periodic burner tune-ups) and operate within recommended combustion air and fuel ranges (i.e. good air/fuel mixing in combustion zone). This promotes efficient and complete combustion of fuel, which results in reduction of combustion emissions.

The proposed project includes modified emission units that are subject to PSD review and will have VOC and CO emissions increases requiring a BACT analysis. The table below represents these emission units, with associated equipment, and the estimated potential VOC and CO emissions from these emission units.

Table V.A-1: Potential VOC & CO Emissions*

Emission Unit	Equipment (Equipment ID)	VOC Emissions		CO Emissions	
		lb/hr	tpy	lb/hr	Tpy
#1 OX	High Pressure Absorber (BT-401)	234	1024.9	1758	7700.7
	Low Pressure Absorber (BT-603)	9.6	42	4.1	18

Table V.A-1: Potential VOC & CO Emissions*					
Emission Unit	Equipment (Equipment ID)	VOC Emissions		CO Emissions	
		lb/hr	tpy	lb/hr	Tpy
	Fugitives	21.5	94.4	N/A	N/A
	Emergency Generator (BM-1201)	0.07	0.003	0.59	0.03
	Emergency Generator (BM-1204)	0.02	0.001	0.57	0.03
#2 OX	High Pressure Absorber (DT-111)	175	766.5	1500	6571.5
	Low Pressure Absorber (DT-302)	8.85	38.8	3.47	15.2
	HPVGTS Fired Heater (DB-1813)	0.08	0.35	1.24	5.41
	Fugitives	21.85	95.7	N/A	N/A
#1 PTA	Crystallizer Vent Scrubber (CM-301)	20	87.6	24	105.1
#2 PTA	Crystallizer Vent Scrubber (DM-601)	20	87.6	20	87.6

* Note that potential emissions are based on no add-on controls for all equipment. The only equipment that currently has controls are the High Pressure Absorbers. Fugitive emissions are based on the LDAR programs currently in place. Emergency Generator PTE's are based on 100 hours per year limit.

B. BACT for VOCs from #1 and #2 Oxidation (OX) Unit High Pressure Absorbers

Each OX Unit's reactor will send overheads to an existing scrubber to recover paraxylene (PX) and then to a recovery device (High Pressure Absorber (HPA)) to recover mainly acetic acid and any residual PX. The HPA outlets are sent to the High Pressure Vent Gas Treatment System (HPVGTS), which consists of a CTO to control VOCs, HAPs, and CO; followed by a bromine scrubber, to control methyl bromide. The VOC PTE from the #1 OX HPA is 1024.9 tons per year, and from the #2 OX HPA is 766.5 tons per year.

<u>Step 1: Identify All Available Control Technologies</u>

The following control technologies were found to reduce VOC emissions from this type of source:

- Thermal Oxidizer (TO)
- Regenerative Thermal Oxidizer (RTO)
- Recuperative Thermal Oxidizer (RCO)
- Catalytic Thermal Oxidizer (CTO)
- Absorber/Wet Scrubber
- Carbon Adsorber
- Condenser
- Flare
- Boiler
- Biofiltration

Step 2: Technical Feasibility of Options

The use of the boiler is not technically feasible because the methyl bromide present in the waste gas streams would cause severe corrosion in the carbon steel boilers. In addition, the large volume of inert gas in the waste stream would require large amounts of supplemental fuel and air to incinerate the waste, and the boiler cannot handle this.

The use of the thermal combustion options (TO, RTO, RCO, CTO, and flare) and recovery options (absorber/scrubber, carbon adsorber, and condenser) are technically feasible since they all are successfully used in similar processes. Although the addition of an absorber/wet scrubber is technically feasible, it would have a lower control efficiency than normal because the waste stream is already being controlled by a two-stage absorber system.

The biofiltration control option is technically feasible because it is successfully used in similar processes. However, it would have a lower control efficiency than normal because of the large amount of methyl bromide present. Methyl bromide is a very toxic biocide and will kill a substantial amount of the microorganisms used to biodegrade the VOCs.

Step 3: Ranking of Control Technologies by Control Effectiveness

The table below is a ranking of the feasible control technologies from Step 2. The controls are ranked from the most to least effective based on their VOC emission reduction potential (% control efficiency) for the HPA.

Table V.B-1: Control Technology Rankings for HPA VOC BACT	
Control Option	**Efficiency (%)**
TO	99
RTO	99
RCO	99
CTO (existing)	98
Flare	98
Carbon Adsorption/TO	96
Condenser	60
Absorber/Wet Scrubber	50
Biofiltration	35

Step 4: Evaluation of Most Effective Controls

This step of the BACT analysis evaluates energy, environmental, and economic impacts of all the feasible control technologies. BPCR decided to use the economic impacts first, then energy and environmental impacts to determine BACT for the affected sources. The following table is a summary of the effectiveness of the control options.

Table V.B-2: Summary of #1 & #2 OX Units HPA VOC BACT Impact Analysis					
Control Option	**Emission Reduction (tpy)**	**Annualized Operating Cost ($)**	**Average Cost Effectiveness ($/ton)**	**Increased Energy Usage ($/yr)**	**Adverse Environmental Impacts?**
TO	1,014.7	$29,021,335	$28,600	11,306,341	No
RTO	1,014.7	19,211,876	18,935	1,002,328	No
RCO	1,014.7	23,432,003	23,100	5,563,302	No
CTO (Existing)	1,004.4	567,782	519	360,206	No
Flare	1,004.4	19,344,753	19,260	2,072,818	No
Carbon Adsorption/TO*	983.9	5,437,736	5,530	28,257	No
Condenser	615	1,772,038	3,458	0	No
Absorber/Wet Scrubber	512.5	271,303	441	0	No
Biofiltration	358.8	17,495,731	48,762	7,578	No

* The Annualized Operating Cost for Carbon Adsorption/TO control is less than the TO control option because the Carbon Adsorption/TO control option uses much less supplemental fuel due to the higher concentration of VOCs from the Adsorber.

Economic Impact Analysis
As shown in Table V.B-2 above, the use of a TO, RTO, RCO, or Flare as a control option is not as cost effective as the existing CTO, which either has the same or relatively same VOC control efficiency (98 to 99%).

Energy Impact Analysis
The feasible control options were evaluated for energy impacts, and it was determined that no unusual energy impacts exist beyond what was included in the economic impact analysis. It was also determined that the various control options do not result in any energy benefits for BPCR.

Environmental Impact Analysis
BPCR has stated that all of the technically feasible control options, except the Biofiltration option, have adverse impacts; however, the BAQ disagrees, as these impacts are considered normal consequences of operating these control technologies. Operation of the combustion control technologies would create more GHG, CO, and NOx. Operation of the CTO requires disposal of spent catalyst, which may be considered hazardous waste. Operation of the condenser would create large quantities of liquid waste that will need to be treated prior to discharge. The operation of the absorber/wet scrubber option would generate large quantities of wastewater that will need to be treated prior to discharge.

Step 5: Select BACT Controls and Limits

BACT has been determined to be the existing CTOs. Using the control efficiency of the existing CTOs, the VOC limit for the #1 and #2 OX HPA has been determined to be 4.70 and 3.50 lb/hr, respectively, based on a 3-hour block average. These limits shall apply at all times including during startup, shutdown, and malfunction.

BPCR will monitor each CTO inlet and outlet temperature, while processes venting to each CTO are in operation. These parameters will be monitored continuously with a daily average, which means that at least one data point shall be measured every 15-minute period, within a 24-hour block period (midnight to midnight), and shall be averaged together for a daily reading. The parameters used to demonstrate compliance will be the daily average inlet temperature and the daily average reactor delta temperature of the CTO. Records of hourly block averages of monitored parameters shall be maintained on site for a period of at least 5 years. Records of excursions of monitored parameters shall be submitted semi-annually. If no excursions occurred during the reporting period then a letter shall be submitted to the Department indicating such. An excursion shall be deemed to have occurred if either of the following are met:

- The daily average for a parameter is outside the approved monitoring range.
- The number of valid 15-minute monitoring periods for a given parameter is less than 75 percent of the number of process operating periods in a 24-hour day.

A source test to determine VOC emission rates from each CTO is required within 180 days after startup and every three years thereafter. If the catalyst is replaced in a CTO, a new source test schedule shall be required as follows: A source test for VOC and CO emissions shall be conducted within 90 days after changing the catalyst in a CTO, and every three years thereafter.

In most cases, a source test for control efficiency is a BACT required monitoring parameter for control devices. However, through discussions with BPCR, a control efficiency test will not be required for the CTOs because historical testing has shown that outlet stream emissions (and sometimes inlet stream emissions) are at or below detection levels, making it difficult to measure efficiencies.

C. BACT for VOCs from #1 and #2 Oxidation (OX) Unit Low Pressure Absorbers

Each Oxidation (OX) Unit utilizes an existing recovery device (Low Pressure Absorber (LPA)) to recover acetic acid from several process streams. The acetic acid, which acts as a solvent in the process, is purified and reused in the process. This recycling of the solvent reduces purchase costs. Part of this project is to optimize acetic acid recovery. These absorbers are used as recovery devices and currently do not have controls. The VOC PTE from the #1 OX LPA is 42 tons per year, and from the #2 OX LPA is 38.8 tons per year.

<u>Step 1: Identify All Available Control Technologies</u>

The following control technologies were found to reduce VOC emissions from this type of source:

- Thermal Oxidizer (TO)
- Regenerative Thermal Oxidizer (RTO)
- Recuperative Thermal Oxidizer (RCO)
- Catalytic Thermal Oxidizer (CTO)
- Absorber/Wet Scrubber
- Carbon Adsorber

- Condenser
- Flare
- Boiler
- Biofiltration

Step 2: Technical Feasibility of Options

The use of the boiler is not technically feasible because the methyl bromide present in the waste gas streams would cause severe corrosion in the carbon steel boilers. In addition, the large volume of inert gas in the waste stream would require large amounts of supplemental fuel and air to incinerate the waste, and the boiler cannot handle this.

The use of the thermal combustion options (TO, RTO, RCO, CTO, and flare) and recovery options (absorber/wet scrubber, carbon adsorber, and condenser) are technically feasible since they all are successfully used in similar processes. Although the addition of an absorber/wet scrubber is technically feasible, it would have a lower control efficiency than normal because the waste stream is already being controlled by a two-stage absorber system.

The biofiltration control option is technically feasible because it is successfully used in similar processes. However, it would have a lower control efficiency than normal because of the large amount of methyl bromide present. Methyl bromide is a very toxic biocide and will kill a substantial amount of the microorganisms used to biodegrade the VOCs.

Step 3: Ranking of Control Technologies by Control Effectiveness

The table below is a ranking of the feasible control technologies from Step 2. The controls are ranked from the most to least effective based on their VOC emission reduction potential (% control efficiency).

Table V.C-1: Control Technology Rankings for LPA VOC BACT

Control Option	Efficiency (%)
TO	99
RTO	99
RCO	99
CTO (New)	98
CTO (Existing)	98
Flare	98
Carbon Adsorption/TO	96
Biofiltration	57
Refrigerated Condenser	55
Absorber/Wet Scrubber	50

Step 4: Evaluation of Most Effective Controls

This step of the BACT analysis evaluates energy, environmental, and economic impacts of all the feasible control technologies. BPCR decided to use the economic impacts first, then energy and environmental impacts to determine BACT for the affected sources. The following table is a summary of the effectiveness of the control options.

Table V.C-2: Summary of #1 & #2 OX Units LPA VOC BACT Impact Analysis					
Control Option	**Emission Reduction (tpy)**	**Annualized Operating Cost ($)**	**Average Cost Effectiveness ($/ton)**	**Increased Energy Usage ($/yr)**	**Adverse Environmental Impacts?**
TO	41.6	$535,524	$12,873	$344,412	No
RTO	41.6	464,581	11,168	188,922	No
RCO	41.6	500,627	12,034	97,422	No
CTO (New)*	41.2	375,878	9,123	100,324	No
CTO (Existing)	41.2	1,062,446	25,788	625,604	No
Flare	41.2	2,925,574	71,010	2,728,146	No
Carbon Adsorber/TO	40.4	491,516	12,166	14,811	No
Biofiltration	23.9	198,756	9,402	7,600	No
Refrigerated Condenser	23.1	367,259	15,900	17,050	No
Absorber/Wet Scrubber	21.0	425,373	20,233	3,789	No

* The Annualized Operating Cost for the New CTO is less than the Existing CTO because the New CTO would operate at a lower pressure and be much smaller since it would be only controlling emissions from the LPA.

<u>Economic Impact Analysis</u>

The control technologies listed in Table V.C-2 above are not cost effective. All of the control technologies would require additional equipment (i.e. fan, blower, compressor) to raise the pressure of the LPA outlet streams. The use of a direct flame oxidizer option (TO, RTO, or RCO) would also not be cost effective due the need to have stainless steel metallurgy. This is recommended for streams containing halogen compounds (methyl bromide in this case) where there can be formation of highly corrosive acid gases. The use of absorber/wet scrubber is also not cost effective because of the low VOC concentration of the LPA outlet stream.

<u>Energy Impact Analysis</u>

The feasible control options were evaluated for energy impacts, and it was determined that no additional energy impacts exist beyond what was included in the economic impact analysis. It was also determined that the various control options do not result in any energy benefits for BPCR.

<u>Environmental Impact Analysis</u>

BPCR has stated that all of the technically feasible control options have adverse impacts; however, the BAQ disagrees, as these impacts are considered normal consequences of operating these control technologies. Operation of the combustion control technologies would create more GHG, CO, and NOx. Operation of the CTO requires disposal of spent catalyst, which may be considered hazardous waste. Operation of the condenser would create large quantities of liquid waste that will need to be treated prior to discharge. The operation of the absorber/wet scrubber option would generate large quantities of wastewater that will need to be treated prior to discharge.

<u>Step 5: Select BACT Controls and Limits</u>

Because none of the control options were deemed feasible, a VOC limit, along with monitoring, recordkeeping, and reporting was set as BACT. Using the recovery efficiency of the LPAs, the VOC limit for the #1 and #2 OX LPA has been determined to be 9.60 and 8.85 lb/hr, respectively, based on a 3-hour block average, each. These limits shall apply at all times including during startup, shutdown, and malfunction.

BPCR will monitor LPA top liquid flow and LPA top temperature, while processes venting to the LPA are in operation. These parameters will be monitored continuously with a daily average, which means that at least one data point shall be measured every 15-minute period, within a 24-hour block period, and shall be averaged together for a daily reading. Records of hourly block averages of monitored parameters shall be maintained on site for a period of at least 5 years. Records of excursions of monitored parameters shall be submitted semi-annually. If no excursions occurred during the reporting period then a letter shall be submitted to the Department indicating such. An excursion shall be deemed to have occurred if either of the following are met:

- The daily average for a parameter is outside the approved monitoring range.
- The number of valid 15-minute monitoring periods for a given parameter is less than 75 percent of the number of process operating periods in a 24-hour day.

A source test to determine VOC emission rates from the LPA units is required within 180 days after startup, and every 3 years thereafter.

D. BACT for VOCs from #1 and #2 Oxidation (OX) Unit Fugitives

Each Oxidation (OX) Unit has equipment that emits fugitive VOC emissions from valves, flanges, drains, vents, pumps, relief valves, etc. Currently the OX units' fugitive emissions are being minimized through various leak detection and repair (LDAR) programs, to include NSPS VV, a modified version of NSPS VV, and the HON. For the BACT analysis, BPCR used the NSPS VV LDAR program as the baseline, and an upgrade to either a NSPS VVa or a HON LDAR will be considered. The fugitive VOC PTE and baseline from the #1 OX unit is 94.4 tons per year, and from the #2 OX unit is 95.7 tons per year.

Step 1: Identify All Available Control Technologies

An LDAR program was the only control technology found to apply to fugitive emissions. An LDAR program is a work practice designed to identify leaking equipment so that emissions can be reduced through repairs. A component that is subject to LDAR requirements must be monitored at specified, regular intervals to determine whether it is leaking or not. Any leaking component must be repaired or replaced within a specified time frame. LDAR programs are governed by several different regulations, including National Emission Standards for Hazardous Air Pollutant (NESHAPs), New Source Performance Standards (NSPS) Subpart VV/VVa, the Hazardous Organic NESHAP (HON), Maximum Achievable Control Technology (MACT), State Implementation Plans (SIPs), the Resource Conservation and Recovery Act (RCRA), and other state or local requirements (i.e. - Consent Decrees). Typically a facility uses a combination of LDAR programs, as BPCR is currently.

Step 2: Technical Feasibility of Options

LDAR programs are a widely accepted control technology used to reduce fugitive VOC emissions in chemical plants, making them technically feasible for BPCR.

Step 3: Ranking of Control Technologies by Control Effectiveness

The table below is a ranking of the feasible control technologies from Step 2. The controls are ranked from the most to least effective based on their VOC emission reduction potential (Effectiveness Factor). The table below uses two example components (valve and pump) to compare effectiveness of each control option.

Table V.D-1: Control Technology Rankings for OX Unit Fugitives VOC BACT		
CONTROL OPTION	**Valves - Light Liquid Service Control Effectiveness (%)**	**Pumps - Light Liquid Service Control Effectiveness (%)**
HON MACT LDAR Program	88	75
NSPS VVa LDAR Program	88	71
LDAR VV Program (existing)	61	69

Step 4: Evaluation of Most Effective Controls

This step of the BACT analysis evaluates energy, environmental, and economic impacts of all the feasible control technologies. BPCR decided to use the economic impacts first, then energy and environmental impacts to determine BACT for the affected sources. The following table is a summary of the effectiveness of the control options.

Table V.D-2: Summary of #1 & #2 OX Units Fugitive VOC BACT Impact Analysis			
Control Option	Emission Reduction (tpy)	Annualized Operating Cost ($)	Average Cost Effectiveness ($/ton)
Upgrade NSPS VV to HON	146.0	$72,600	$497
Upgrade NSPS VV to VVa	46.4	59,640	1,285

Economic Impact Analysis
As shown in Table V.B-2 above, the top control option is also the most cost effective.

Energy Impact Analysis
Upgrading to the HON LDAR program does not contribute to any unusual energy penalties or benefits.

Environmental Impact Analysis
Upgrading to the HON LDAR program does not contribute to any adverse environmental impacts.

Step 5: Select BACT Controls and Limits

BACT has been determined to be an upgrade to the HON LDAR program (covered under Regulation 40 CFR 63 Subpart H) for all fugitive VOC emissions in the #1 and #2 OX Units. All VOCs will be treated as HAPs for determining monitoring applicability. These limits shall apply at all times including during startup, shutdown, and malfunction. Monitoring, recordkeeping, and reporting will be in accordance with the HON LDAR (63.160 through 60.182). Testing shall be performed as per 40 CFR 63.180.

E. BACT for VOCs from #1 and #2 PTA Crystallizer Vent Scrubbers (CVS)

Each Purified Terephthalic Acid (PTA) Unit utilizes crystallizers to purify the crude TA. These crystallizers flash off liquids in order to control the temperature of the crystallizers. The vapor stream from each crystallizer is sent to a vent scrubber to remove particulate matter (PM), which is mostly PTA. The scrubbed vapor from the CVS, consisting of mostly water (99%) and small amounts of VOCs, is vented to the atmosphere. The VOC PTE from the #1 PTA and #2 PTA CVS is 87.6 tons per year, each, based on a 3-hour block average. These limits shall apply at all times including during startup, shutdown, and malfunction.

Step 1: Identify All Available Control Technologies

The following control technologies were found to reduce VOC emissions from this type of source:

- Thermal Oxidizer (TO)
- Regenerative Thermal Oxidizer (RTO)
- Recuperative Thermal Oxidizer (RCO)
- Catalytic Thermal Oxidizer (CTO)
- Absorber/Wet Scrubber
- Carbon Adsorber
- Condenser
- Flare
- Boiler
- Biofiltration

Step 2: Technical Feasibility of Options

The operation of a flare is not technically feasible, because the exhaust streams from the crystallizers is 99% water and have very low heating values (less than 5 Btu/scf). The operation of a carbon adsorber is not technically feasible, because at moisture contents over 50%, the water molecules compete with the VOC molecules for adsorption. This significantly lowers the capacity, and therefore the efficiency, of the adsorber system. The use of the boiler is not technically feasible because the large volume of inert gas in the waste stream would require large amounts of supplemental fuel and air to incinerate the waste, and the boiler cannot handle this.

The use of the remaining control options is technically feasible since they all are successfully used in similar processes. The control efficiency of the biofiltration control option would be lower than typical due to the presence of VOC compounds that are not water soluble. Additionally, the large amounts of water vapor in the inlet stream would require dehumidification prior to being sent to the biofiltration and absorber/wet scrubber control options.

Step 3: Ranking of Control Technologies by Control Effectiveness

The table below is a ranking of the feasible control technologies from Step 2. The controls are ranked from the most to least effective based on their VOC emission reduction potential (% control efficiency).

Table V.E-1: Control Technology Rankings for Crystallizer Vent Scrubber VOC BACT

Control Option	Efficiency (%)
TO	99
RTO	99
RCO	99
CTO (New)	98
CTO (Existing)	98
Absorber/Wet Scrubber	90
Biofiltration	70
Condenser	60

Step 4: Evaluation of Most Effective Controls

This step of the BACT analysis evaluates energy, environmental, and economic impacts of all the feasible control technologies. BPCR decided to use the economic impacts first, then energy and environmental impacts to determine BACT for the affected sources. The following table is a summary of the effectiveness of the control options.

Table V.E-2: Summary of CVS VOC BACT Impact Analysis

Control Option	Emission Reduction (tpy)	Annualized Operating Cost ($)	Average Cost Effectiveness ($/ton)	Increased Energy Usage ($/yr)	Adverse Environmental Impacts?
TO	86.7	$1,606,826	$18,533	$1,420,194	No
RTO	86.7	1,107,759	12,780	840,446	No
RCO	86.7	1,772,897	20,450	1,342,851	No
CTO (New)*	85.8	1,214,489	14,155	913,344	No
CTO (Existing)	85.8	1,748,926	20,384	1,428,322	No
Absorber/Wet Scrubber	78.8	717,878	9,110	11,366	No
Biofiltration	65.7	495,525	7,542	9,472	No
Condenser	52.6	438,446	8,335	18,944	No

* The Annualized Operating Cost for the New CTO is less than the Existing CTO because the New CTO would operate at a

lower pressure and be much smaller since it would be only controlling emissions from the LPA.

Economic Impact Analysis

As shown in Table V.E-2 above, all the control options are not cost effective. All of the control technologies would require additional equipment (i.e. fan, blower) to raise the pressure of the CVS outlet streams. Use of a combustion control option (TO, RTO, RCO, CTO) would require large amounts of supplemental fuel and air to incinerate the waste because of the large volume of inert gas in the CVS outlet streams. Use of the existing CTO would require a compressor (much more costly than a fan/blower) to provide the pressure required to route the CVS outlet stream to the HPVGTS. Use of the biofiltration and absorber/wet scrubber control options would require a dehumidification system to remove the large volume of water from the CVS outlet streams, which also increases cost.

Energy Impact Analysis

The feasible control options were evaluated for energy impacts, and it was determined that no additional energy impacts exist beyond what was included in the economic impact analysis. It was also determined that the various control options do not result in any energy benefits for BPCR.

Environmental Impact Analysis

BPCR has stated that all of the technically feasible control options, except the Biofiltration option, have adverse impacts; however, the BAQ disagrees, as these impacts are considered normal consequences of operating these control technologies. Operation of the combustion control technologies would create more GHG, CO, and NOx. Operation of the CTO requires disposal of spent catalyst, which may be considered hazardous waste. Operation of the absorber/wet scrubber or condenser would create large quantities of liquid waste that will need to be treated prior to discharge.

Step 5: Select BACT Controls and Limits

Because none of the control options were deemed feasible, a VOC limit, along with monitoring, recordkeeping, and reporting was set as BACT. Using the uncontrolled emissions of the CVS, the VOC limit for the #1 and #2 PTA CVS has been determined to be 20.0 lb/hr, each, based on a 3-hour block average. These limits shall apply at all times including during startup, shutdown, and malfunction.

BPCR will be required to calculate and maintain hourly VOC emissions. Hourly VOC emissions shall be calculated on a 3-hour block average. Reports of the calculated values shall be submitted semiannually, and maintained on site for a period of at least 5 years.

A source test to determine VOC emission rates from each CVS is required within 180 days after startup, and every 3 years thereafter.

F. BACT for CO from #1 and #2 Oxidation (OX) Unit High Pressure Absorbers

As discussed in the VOC BACT analysis for the HPAs, each OX Unit utilizes the HPA as a recovery device to reclaim mainly acetic acid, and residual paraxylene. CO is created as byproduct from the unwanted side reaction of oxygen and acetic acid in the reactor. The HPA outlets are sent to the High Pressure Vent Gas Treatment System (HPVGTS), which consists of a Catalytic Thermal Oxidizer (CTO), followed by a bromine scrubber. The HPVGTS controls VOCs, HAPs, and CO.

The CO PTE from the #1 OX HPA is 7700 tons per year, and from the #2 OX HPA is 6571.5 tons per year.

Step 1: Identify All Available Control Technologies

The following control technologies were found to reduce CO emissions from this type of source:

- Thermal Oxidizer (TO)
- Regenerative Thermal Oxidizer (RTO)
- Recuperative Thermal Oxidizer (RCO)
- Catalytic Thermal Oxidizer (CTO)
- Flare
- Boiler
- Good Combustion Practices

Step 2: Technical Feasibility of Options

The use of a flare is not technically feasible, since more CO emissions are created, from the burning of required supplemental fuel, than destroyed. Good combustion practices are not technically feasible because the HPA is not a combustion process. The use of the boiler is not technically feasible because the methyl bromide present in the waste gas streams would cause severe corrosion in the carbon steel boilers. In addition, the large volume of inert gas in the waste stream would require large amounts of supplemental fuel and air to incinerate the waste, which the boiler cannot handle. The use of the thermal combustion options (TO, RTO, RCO, and CTO) is technically feasible since they all are successfully used in similar processes.

Step 3: Ranking of Control Technologies by Control Effectiveness

The table below is a ranking of the feasible control technologies from Step 2. The controls are ranked from the most to least effective based on their CO emission reduction potential (% control efficiency).

Table V.F-1: Control Technology Rankings for HPA CO BACT	
Control Option	**Efficiency (%)**
TO	95
RTO	95
RCO	95
CTO (Existing)	95

Step 4: Evaluation of Most Effective Controls

This step of the BACT analysis evaluates energy, environmental, and economic impacts of all the feasible control technologies. BPCR decided to use the economic impacts first, then energy and environmental impacts to determine BACT for the affected sources. The following table is a summary of the effectiveness of the control options.

Table V.F-2: Summary of #1 & #2 OX Units HPA CO BACT Impact Analysis					
Control Option	**Emission Reduction (tpy)**	**Annualized Operating Cost ($)**	**Average Cost Effectiveness ($/ton)**	**Increased Energy Usage ($/yr)**	**Adverse Environmental Impacts?**
TO*	7,160.6	$29,021,335	$4,060	11,306,341	No
RTO*	7,288.6	19,211,976	2,636	1,362,534	No
RCO*	7,231.6	23,400,467	3,236	5,923,508	No
CTO (Existing)**	7,297.6	567,782	78	360,205	No

* These control options have CO generated from combustion of supplemental fuel and VOCs in the waste gas stream, slightly off-setting the CO reduction.

** This control option has CO generated from combustion of VOCs in the waste gas stream, slightly off-setting the CO reduction.

Economic Impact Analysis
As shown in Table V.F-2 above, the use of a TO, RTO, or RCO control option is not as cost effective as the existing CTO, which has the same CO control efficiency of 95%.

Energy Impact Analysis
The feasible control options were evaluated for energy impacts, and it was determined that no unusual energy impacts exist beyond what was included in the economic impact analysis. It was also determined that the various control options do not result in any energy benefits for BPCR.

Environmental Impact Analysis
BPCR has stated that all of the technically feasible control options, except the Biofiltration option, have adverse impacts; however, the BAQ disagrees, as these impacts are considered normal consequences of operating these control technologies. Operation of the combustion control technologies would create more GHG, CO, and NOx. Operation of the CTO requires disposal of spent catalyst, which may be considered hazardous waste.

Step 5: Select BACT Controls and Limits

BACT has been determined to be the existing CTO's. Using the control efficiency of the existing CTOs, the CO limit for the #1 and #2 OX HPA has been determined to be 87.9 and 75.0 lb/hr, respectively, based on a 30-day rolling average. These limits shall apply at all times including during startup, shutdown, and malfunction.

BPCR will monitor each CTO inlet and outlet temperature, while processes venting to each CTO are in operation. These parameters will be monitored continuously with a daily average, which means that at least one data point shall be measured every 15-minute period, within a 24-hour block period (midnight to midnight), and shall be averaged together for a daily reading. The parameters used to demonstrate compliance will be the daily average inlet temperature and the daily average reactor delta temperature of the CTO. Records of hourly block averages of monitored parameters shall be maintained on site for a period of at least 5 years. Records of excursions of monitored parameters shall be submitted semi-annually. If no excursions occurred during the reporting period then a letter shall be submitted to the Department indicating such. An excursion shall be deemed to have occurred if either of the following are met:

- The daily average for a parameter is outside the approved monitoring range.
- The number of valid 15-minute monitoring periods for a given parameter is less than 75 percent of the number of process operating periods in a 24-hour day.

A source test to determine VOC emission rates from each CTO is required within 180 days after startup and every three years thereafter. If the catalyst is replaced in a CTO, a new source test schedule will be required as follows: A source test for VOC and CO emissions shall be conducted within 90 days after changing the catalyst in a CTO, and every three years thereafter.

In most cases, a source test for control efficiency is a BACT required monitoring parameter for control devices. However, through discussions with BPCR, a control efficiency test will not be required for the CTOs because historical testing has shown that outlet stream emissions (and sometimes inlet stream emissions) are at or below detection levels, making it difficult to measure efficiencies.

G. BACT for CO from #1 and #2 Oxidation (OX) Unit Low Pressure Absorbers

As discussed in the VOC BACT analysis for the LPAs, each OX Unit utilizes the LPA as a recovery device to reclaim acetic acid. CO is created as byproduct from the unwanted side reaction of oxygen and acetic acid in the reactor. The LPAs do not recover or control any CO; and therefore, all CO is emitted to the atmosphere. There are currently no controls on the LPAs. The CO PTE from the #1 OX LPA is 18 tons per year, and from the #2 OX LPA is 15.2 tons per year.

<u>Step 1: Identify All Available Control Technologies</u>

The following control technologies were found to reduce CO emissions from this type of source:

- Thermal Oxidizer (TO)
- Regenerative Thermal Oxidizer (RTO)
- Recuperative Thermal Oxidizer (RCO)
- Catalytic Thermal Oxidizer (CTO)
- Flare
- Boiler
- Good Combustion Practices

<u>Step 2: Technical Feasibility of Options</u>

The use of a flare is not technically feasible, since more CO emissions are created, from the burning of required supplemental fuel, than destroyed. Good combustion practices are not technically feasible because the LPA is not a combustion process. The boiler is not technically feasible because the large volume of inert gas in the waste stream would require large amounts of supplemental fuel and air to incinerate the waste, which the boiler cannot handle. The use of the thermal combustion options (TO, RTO, RCO, and CTO) is technically feasible since they all are successfully used in similar processes.

Step 3: Ranking of Control Technologies by Control Effectiveness

The table below is a ranking of the feasible control technologies from Step 2. The controls are ranked from the most to least effective based on their CO emission reduction potential (% control efficiency).

Table V.G-1: Control Technology Rankings for LPA CO BACT	
Control Option	**Efficiency (%)**
TO	95
RTO	95
RCO	95
CTO (New)	95
CTO (Existing)	95

Step 4: Evaluation of Most Effective Controls

This step of the BACT analysis evaluates energy, environmental, and economic impacts of all the feasible control technologies. BPCR decided to use the economic impacts first, then energy and environmental impacts to determine BACT for the affected sources. The following table is a summary of the effectiveness of the control options.

Table V.G-2: Summary of #1 & #2 OX Units LPA CO BACT Impact Analysis					
Control Option	**Emission Reduction (tpy)**	**Annualized Operating Cost ($)**	**Average Cost Effectiveness ($/ton)**	**Increased Energy Usage ($/yr)**	**Adverse Environmental Impacts?**
TO	17.1	$535,524	$31,317	$329,068	No
RTO	17.1	464,581	27,168	188,922	No
RCO	17.1	500,627	29,276	97,422	No
CTO (New)*	17.1	375,828	21,978	132,869	No
CTO (Existing)	17.1	1,062,446	62,131	1,428,322	No

* The Annualized Operating Cost for the New CTO is less than the Existing CTO because the New CTO would operate at a lower pressure and be much smaller since it would be only controlling emissions from the LPA.

Economic Impact Analysis

The technologies listed in Table V.C-2 above are not cost effective. All of the control technologies would require additional equipment (i.e. fan, blower) to raise the pressure of the LPA outlet streams The use of a direct flame oxidizer option (TO, RTO, or RCO) would also not be cost effective due the need to have stainless steel metallurgy. This is recommended for streams containing halogen compounds (methyl bromide in this case) where there can be formation of highly corrosive acid gases.

Energy Impact Analysis

The feasible control options were evaluated for energy impacts, and it was determined that no additional energy impacts exist beyond what was included in the economic impact analysis. It was also determined that the various control options do not result in any energy benefits for BPCR.

Environmental Impact Analysis

BPCR has stated that all of the technically feasible control options, except the Biofiltration option, have adverse impacts; however, the BAQ disagrees, as these impacts are considered normal consequences of operating these control technologies. Operation of the combustion control technologies would create more GHG, CO, and NOx. Operation of the CTO requires disposal of spent catalyst, which may be considered hazardous waste.

Step 5: Select BACT Controls and Limits

Because none of the control options were deemed feasible, a CO limit, along with monitoring, recordkeeping, and reporting was set as BACT. Using the recovery efficiency of the LPAs, the CO limit for the #1 and #2 OX LPA has been determined to be 4.10 and 3.50 lb/hr, respectively, based on a 30-day rolling average. These limits shall apply at all times including during startup, shutdown, and malfunction.

BPCR will be required to calculate and maintain hourly CO emissions. Hourly CO emissions shall be calculated on a 30-day rolling average. Reports of the calculated values shall be submitted semiannually, and shall be maintained on site for a period of at least 5 years.

A source test to determine CO emission rates from the LPA units is required within 180 days after startup, and every 3 years thereafter.

H. BACT for CO from #1 and #2 PTA Crystallizer Vent Scrubbers

As discussed in the VOC BACT analysis for the CVS, each PTA Unit utilizes crystallizers to purify the crude TA. These crystallizers flash off liquids in order to control the temperature of the crystallizers. The vapor stream from each crystallizer is sent to a vent scrubber to remove particulate matter (PM), which is mostly PTA. The scrubbed vapor from the CVS consists of mostly water (99%) and small amounts of CO. The CO PTE from the #1 PTA and #2 PTA CVS is 105.1 and 87.6 tons per year, respectively.

Step 1: Identify All Available Control Technologies

The following control technologies were found to reduce CO emissions from this type of source:

- Thermal Oxidizer (TO)
- Regenerative Thermal Oxidizer (RTO)
- Recuperative Thermal Oxidizer (RCO)
- Catalytic Thermal Oxidizer (CTO)

- Flare
- Boiler
- Good Combustion Practices

Step 2: Technical Feasibility of Options

The use of a flare is not technically feasible, since more CO emissions are created, from the burning of required supplemental fuel, than destroyed. Good combustion practices are not technically feasible because the CVS is not a combustion process. The boiler is not technically feasible because the large volume of inert gas in the waste stream would require large amounts of supplemental fuel and air to incinerate the waste, and the boiler cannot handle this volume. The use of the thermal combustion options (TO, RTO, RCO, and CTO) is technically feasible since they all are successfully used in similar processes.

Step 3: Ranking of Control Technologies by Control Effectiveness

The table below is a ranking of the feasible control technologies from Step 2. The controls are ranked from the most to least effective based on their CO emission reduction potential (% control efficiency).

Table V.H-1: Control Technology Rankings for CVS CO BACT	
Control Option	**Efficiency (%)**
TO	95
RTO	95
RCO	95
CTO (New)	95
CTO (Existing)	95

Step 4: Evaluation of Most Effective Controls

This step of the BACT analysis evaluates energy, environmental, and economic impacts of all the feasible control technologies. BPCR decided to use the economic impacts first, then energy and environmental impacts to determine BACT for the affected sources. The following table is a summary of the effectiveness of the control options.

Table V.H-2: Summary of #1 & #2 PTA CVS CO BACT Impact Analysis					
Control Option	**Emission Reduction (tpy)**	**Annualized Operating Cost ($)**	**Average Cost Effectiveness ($/ton)**	**Increased Energy Usage ($/yr)**	**Adverse Environmental Impacts?**
TO	99.8	$1,594,999	$15,982	$1,413,184	No
RTO	99.8	1,107,759	11,100	840,446	No
RCO	99.8	1,722,897	17,263	1,342,851	No

Table V.H-2: Summary of #1 & #2 PTA CVS CO BACT Impact Analysis					
Control Option	**Emission Reduction (tpy)**	**Annualized Operating Cost ($)**	**Average Cost Effectiveness ($/ton)**	**Increased Energy Usage ($/yr)**	**Adverse Environmental Impacts?**
CTO (New)	99.8	1,214,489	12,169	913,344	No
CTO (Existing)	99.8	1,748,926	17,524	1,428,322	No

Economic Impact Analysis
The technologies listed in Table V.H-2 above are not cost effective. All of the control technologies would require additional equipment (i.e. fan, blower) to raise the pressure of the CVS outlet streams. These control options would also require large amounts of supplemental fuel and air to incinerate the waste because of the large volume of inert gas in the CVS outlet streams. Use of the existing CTO would require a compressor (much more costly than a fan/blower) to provide the pressure required to route the CVS outlet streams to the HPVGTS.

Energy Impact Analysis
The feasible control options were evaluated for energy impacts, and it was determined that no unusual energy impacts exist beyond what was included in the economic impact analysis. It was also determined that the various control options do not result in any energy benefits for BPCR.

Environmental Impact Analysis
BPCR has stated that all of the technically feasible control options, except the Biofiltration option, have adverse impacts; however, the BAQ disagrees, as these impacts are considered normal consequences of operating these control technologies. Operation of the combustion control technologies would create more GHG, CO, and NOx. Operation of the CTO requires disposal of spent catalyst, which may be considered hazardous waste.

Step 5: Select BACT Controls and Limits

Because none of the control options were deemed feasible, a CO limit, along with monitoring, recordkeeping, and reporting was set as BACT. Using the uncontrolled emissions of the CVS, the CO limit for the #1 and #2 PTA CVS has been determined to be 24.0 lb/hr and 20.0 lb/hr, respectively. These limits shall apply at all times including during startup, shutdown, and malfunction.

BPCR will be required to calculate and maintain hourly CO emissions. Hourly CO emissions shall be calculated on a 30-day rolling average. Reports of the calculated values shall be submitted semiannually, shall be maintained on site for a period of at least 5 years.

A source test to determine CO emission rates from each CVS is required within 180 days after startup, and every 3 years thereafter.

I. BACT for VOC and CO from #2 OX Unit HPVGTS Fired Heater

The #2 OX Unit HPVGTS Fired Heater preheats the waste gas feed stream to the #2 HPVGTS through indirect heat exchange. The VOC and CO emission are from combustion of natural gas fuel in the Fired Heater. The Fired Heater has a single burner that has a nominal rating of 15 MM BTU/hr, but actually operates less than 3 MM BTU/hr on average per year. The VOC and CO PTE from the Fired Heater is 0.4 and 5.4 tpy, respectively.

Step 1: Identify All Available Control Technologies

The following control technologies were found to reduce VOC and CO emissions from this type of source:

- Good Combustion Practices – Good combustion practices for the Fired Heater is to maintain good air/fuel mixture in the combustion zone.
- Flue Gas Recirculation (FGR) – FGR is a method of reducing NOx emissions, by taking some of the re-circulated flue gas and mixing with combustion air. This mixture decreases the flame temperature and the availability of oxygen, thereby reducing the formation of thermal NOx.
- Natural Gas Fuel
- Tune-ups

Step 2: Technical Feasibility of Options

The use of FGR is not technically feasible since it is not compatible with the existing heater. The remaining control options are technically feasible since they all are successfully used on heaters.

Step 3: Ranking of Control Technologies by Control Effectiveness

The technically feasible control options are work practices and cannot be ranked.

Step 4: Evaluation of Most Effective Controls

This step of the BACT analysis evaluates energy, environmental, and economic impacts of all the feasible control technologies. BPCR decided to use the economic impacts first, then energy and environmental impacts to determine BACT for the affected sources. The following table is a summary of the effectiveness of the control options.

Economic Impact Analysis
The use of natural gas, tune-ups, and good combustion practices are currently being used, so there are no associated economic impacts. Use of these control options is economically feasible, as they save money by increasing energy efficiency.

Energy Impact Analysis
The feasible control options were evaluated for energy impacts, and it was determined that no unusual energy impacts exist. It was determined that the tune-ups and good combustion practices result in any energy benefits for BPCR, due to increase energy efficiency.

Environmental Impact Analysis
The feasible control options have some environmental benefit due to reduction in energy usage, which lowers emissions of combustion pollutants such as GHG, CO, and NOx.

Step 5: Select BACT Controls and Limits

BACT for the Fired Heater has been determined to be the sole use of natural gas, annual tune-ups, and good combustion practices. Using the AP-42 emission factors for natural gas combustion of 5.5 lb/MM SCF for VOC and 84 lb/MM SCF for CO, and a heat content of 1000 BTU/SCF; the VOC limit has been determined to be 0.0055 lb/MM BTU, and the CO limit has been determined to be 0.084 lb/MM BTU, each based on a 3-hour block average. These limits shall apply at all times including during startup, shutdown, and malfunction.

BPCR is required to monitor and record natural gas fuel usage on a monthly basis. Records of natural gas usage shall be submitted semiannually, and shall be maintained on site for a period of at least 5 years.

BPCR is required to develop a tune-up plan and perform tune-ups on this source, once every 13 months. The tune-up plan will be developed in accordance with manufacturer's specifications or with good engineering practices. Records of tune-ups shall be submitted semiannually, and shall be maintained on site for a period of at least 5 years. The tune-up plan shall only be included in the initial report. Subsequent submittals of the tune-up plan are required within 30 days of the change if the plan is modified or the Department requests additional information.

BPCR is required to implement good combustion practice(s) on this source, by maintaining proper air/fuel mixture in the combustion zone by holding excess oxygen between 3.5 and 12%. Percent (%) excess oxygen shall be monitored continuously with a daily average, which means that at least one data point shall be measured every 15-minute period, within a 24-hour block period (midnight to midnight), and shall be averaged together for a daily reading. Records of hourly block averages of monitored parameters shall be maintained on site for a period of at least 5 years. Records of excursions of monitored parameters shall be submitted semi-annually. If no excursions occurred during the reporting period then a letter shall be submitted to the Department indicating such. An excursion shall be deemed to have occurred if either of the following are met:

- The daily average for a parameter is outside the approved monitoring range.
- The number of valid 15-minute monitoring periods for a given parameter is less than 75 percent of the number of process operating periods in a 24-hour day.

J. BACT for VOC and CO from #1 OX Unit Emergency Generators

The #1 OX Unit will have installed two new emergency generators for this project (the BM-1201 Emergency Generator replacement and the new BM-1204 Emergency Generator). Both generators will be fired with diesel fuel, and will be subject to 40 CFR 60, Subpart IIII "Standards of Performance for Stationary Compression Ignition Internal Combustion Engines". The generators will be required to meet Tier 3 emission standards and will be limited to operating no more than 100 hours per year on a non-emergency basis. The 100 hours per year limit and the Tier 3 emission standards will make emissions of VOC (0.003 tpy) and CO (0.03 tpy) minimal. Therefore, a full BACT analysis was not performed on these two generators. The proposed BACT limit for each generator will be an operational restriction of no more than 100 hours per year of non-emergency use, compliance with Tier 3 emission standards, and the burning of only ultra low diesel as fuel. These limits shall apply at all times including during startup, shutdown, and malfunction.

BPCR is required to record the actual operating hours of each generator on a monthly basis. Reports of the recorded hours of operation shall be submitted semiannually, and shall be maintained on site for a period of at least 5 years.

BPCR is required to monitor and record diesel fuel usage on a monthly basis. Fuel oil supplier certification shall be obtained for each batch of oil received and stored on site. Records of diesel fuel usage and reports of the recorded sulfur content shall be submitted semiannually, and shall be maintained on site for a period of at least 5 years.

K. Summary of BACT Limits

Table V.K-1: Summary of BACT Limits

Process/Equipment	Pollutant	BACT Limit	Control Method
#1 OX High Pressure Absorber	VOC	4.70 lb/hr	CTO
	CO	87.9 lb/hr	CTO
#1 OX Low Pressure Absorber	VOC	9.60 lb/hr	N/A
	CO	4.10 lb/hr	N/A
#1 OX Fugitives	VOC	HON LDAR	HON LDAR
#1 PTA Crystallizer Vents	VOC	20.0	N/A
	CO	24.0	N/A
#2 OX High Pressure Absorber	VOC	3.50	CTO
	CO	75.0	CTO
#2 OX Low Pressure Absorber	VOC	8.85	N/A
	CO	3.50	N/A
#2 OX Fugitives	VOC	HON LDAR	HON LDAR
#2 PTA Crystallizer Vents	VOC	20.0	N/A
	CO	20.0	N/A
#2 OX HPVGTS Fired Heater	VOC	0.0055 lbs/MM BTU	Good Combustion Practices, Natural Gas as sole fuel, Tune-ups
	CO	0.084 lbs/MM BTU	
#1 OX New Emergency Generators	VOC	100 hours per year non-emergency use, Tier 3 emission standards, and use of only ultra low sulfur (15 ppm) diesel fuel	N/A
	CO		

VI. Air Quality Impact Analysis

For a major facility, PSD regulations require an applicant to analyze the impact from the construction of a proposed new source(s) on the following areas:

1. Compliance with the National Ambient Air Quality Standards (NAAQS);
2. Compliance with the PSD Increments;
3. Significant impact on PSD Class I Areas, including Class I PSD increments;
4. Impairments to visibility, soil, and vegetation; and
5. Air Quality impact of general growth associated with the source.

All minor and major sources proposing new construction or construction modifications in South Carolina (SC) are also required to demonstrate that their facility will remain in compliance with South Carolina Regulation 61-62.5 Standards 2 (AAQS), and 7 (Class II PSD Increments).

General results of this compliance demonstration indicate that there will be no exceedances of PSD Class II SILs or South Carolina ambient air quality standards PSD increments. Since this project was below the AQRV threshold, no refined Class I modeling was performed

All minor and major sources proposing new construction are also required to demonstrate compliance with South Carolina Regulation 61-62.5 Standard No. 8 (toxics) unless otherwise exempt. All emissions of toxic air pollutants from the proposed facility will be emitted from sources which will be in compliance with a Maximum Achievable Control Technology (MACT) standard at startup and/or are the product of the burning of virgin fuel. As such, the proposed facility is exempt from the requirements of Standard 8 and no modeling is required for this standard.

A. PSD Class II Modeling Analysis

The PSD Review requires pollutants, which are determined to be "major", be evaluated by an Air Quality Impact Analysis and Additional Impacts Analysis. The Air Quality Impact Analysis consists of (1) a Preliminary Modeling Analysis to determine which pollutants from the proposed project at the facility only**,** exceed their Class II Significant Impact Levels (SIL); and (2) a more comprehensive Full Impact Analysis based on concentrations of pollutants that exceed the SIL for the facility and additional 'facility-wide' impacts from other facilities that may impact the Significant Impact Area (SIA). The Additional Impacts Analysis evaluates the impacts on soils, vegetation, and visibility effects.

A.1. PSD CLASS II PRELIMINARY MODELING ANALYSIS

Potential emission rates or net emission rate increases for each pollutant determined to be significant (Table IV-1.) at the facility were modeled to determine (a) the Significant Impact Level (SIL); and (b) whether or not the facility may be exempted from the ambient monitoring data requirements. Each of these three preliminary Class II analyses is discussed below.

A.1.a. SIGNIFICANT IMPACT LEVEL (SIL) ANALYSIS

If an impact is less than the SIL, then no further PSD analysis is required. Table VI-1 provides the results of the SIL modeling analysis for this project for the "major" pollutants as defined above. Maximum concentrations are used for the Significant Impact Level analysis (i.e. Highest-First-High). This analysis, which shows SILs were not exceeded for CO for the averaging periods indicated. Therefore, a Full Impact analysis was not required for this pollutant. No further PSD analysis is required for CO; however, CO must be included in the facility-only South Carolina Standard 2 modeling.

TABLE VI-1. CLASS II PREVENTION OF SIGNIFICANT DETERIORATION (PSD) SIGNIFICANT IMPACT LEVEL

POLLUTANT	AVERAGING TIME	MODEL USED	MAXIMUM IMPACT ($\mu g/m^3$)	SIL ($\mu g/m^3$)	Exceeds SIL (Yes/No)	SIGNIFICANT IMPACT AREA (km)
CO	1 HOUR	AERMOD	217	2000	No	N/A
	8 HOUR	AERMOD	83	500	No	N/A
Ozone is not modeled, but a general impact assessment is to be made if the source is major for ozone as determined in Table IV-1.						
Maximum concentrations are used for the Significant Impact Level analysis (i.e. Highest-First-High).						

It should be noted that while source BT-702 shows an offset emission source with a negative emission rate for #1 OX DHT Overhead Scrubber (BT-702), this source would have operated at that rate only sporadically. Consequently, the results shown in Table VI.1 include the stacks with the positive emissions rates. These predicted values are below the PSD significant impact thresholds of 2,000 µg/m3 (1-hour) and 500 µg/m3 (8-hours). Therefore, no further modeling analysis is required for CO.

Analysis for Volatile Organic Compound Impact

No air quality model exists that can evaluate the air quality impact of a point source of VOC emissions on area-wide ozone concentrations. This project was evaluated using a project related net increase in VOC emissions of 164.4 TPY. The estimated increase in emissions of NO_X is below the PSD significant emission increase threshold.

The area measured values of ozone in the Charleston area for the last 3 years are listed below.

- Bushy Park Monitor # 45015002
  - 8-hour average 4th high – 0.061 ppm, 0.065 ppm, 0.066 ppm (2012, 2011, 2010)
- Cape Romain # 450190046
  - 8-hour average 4th high – 0.064 ppm, 0.066 ppm, 0.068 ppm (2012, 2011, 2010)

The National Ambient Air Quality Standard (NAAQS) for ozone is 0.075 ppm. The monitored values above show the area to be well in attainment of the 8-hour ozone NAAQS.

The VOC impact was based on the project having an increase in VOC emissions of 164.4 TPY and less than 40 TPY of NO_X emissions. The Southeastern United States, including South Carolina, is NO_X limited with regards to ozone formation. This means that there is an excess of VOC in the atmosphere with regards to ozone formation and increases in VOC do not lead to increases in ozone production. The excess VOC is in part due to natural sources in the environment. Due to the excess VOC, only increases in NO_X in this region are a concern with regards to ozone formation. This project does not result in a significant increase in NO_X emissions so it would be expected that the project as a whole would have minimal impact on area ozone concentrations. Ambient impacts from NO_X are addressed in NO_X modeling.

To better assess the relative nature of the project increase in VOC emissions, average actual VOC emissions for the Charleston County and three other surrounding Counties are presented below.

COUNTY 3-YEAR AVERAGE ACTUAL VOC EMISSIONS (TPY)

- Charleston 1,430
- Berkeley 1,625
- Dorchester 470
- Colleton 857
- Total for Area 4,382

The project VOC emissions impact was based on an estimated VOC emissions increase of 164.4 TPY from this project. This value represents 3.8 percent of the actual area-wide point source emissions of VOCs. Note that this total does not include mobile sources or emissions from minor sources in the area.

Because project emission level increases for VOCs for this project are relatively small and the project does not have a significant increase in NO_X emissions (recall the area is NO_X limited with respect to the formation of ozone), it is concluded this project would not cause or contribute to a violation of the NAAQS for ozone.

A.1.b. SIGNIFICANT IMPACT AREA (SIA) ANALYSIS

The impact area is a circular area with a radius extending from the source to (1) the most distant point where approved dispersion modeling predicts a significant ambient impact will occur (greater than or equal to the SIL), or (2) a modeling receptor distance of 50 km, whichever is less. An impact area is initially established for each pollutant for every averaging time. Sources within the SIA will be used for this analysis.

Since no pollutant concentrations exceeded their respective SILs, this project is not subject to the SIA analysis.

A.1.c. SIGNIFICANT MONITORING CONCENTRATION ANALYSIS

Modeling significance results for PM_{10}, SO_2, NO_2, and CO are shown below along with significant monitoring concentrations for these pollutants. The significant monitoring concentrations are from SC Regulation 61-62.5, Standard No. 7. Impacts are the maximum modeled concentrations for each pollutant (i.e. Highest First High).

TABLE VI-2. SIGNIFICANT MONITORING CONCENTRATIONS				
Pollutant	Averaging Period	Max. Impact ($\mu g/m^3$)	Significant Monitoring Concentration ($\mu g/m^3$)	Exceeds (Y or N)
CO	8-Hour	83	575	N0

The maximum impacts for CO are below the significant monitoring concentration (SMC) levels, therefore, no pre-construction monitoring is required for these pollutants.

Since this site is significant for VOCs, ozone monitoring data also needs to be reviewed. Section 2.4 of U.S. EPA's *Ambient Monitoring Guidelines for Prevention of Significant Deterioration* (EPA-450/4-87-007) permits the use of existing representative air quality data in place of preconstruction monitoring data, provided the monitor location, how current the data is, and the quality of data are acceptable.

The nearest regional monitor for the BP Amoco – Cooper River Plant for CO is located at the Cape Romain station. Since the Cape Romain CO monitor is located in a Class I area on the coast of South Carolina and may not be entirely representative of a more inland, rural area, an alternative monitoring location was sought. The only other candidate site for CO background data in South Carolina is the Greenville County Health Department monitoring station. While this monitoring station is located over 270 km from the project facility, it is in a major urban area with significant CO emissions and is a very conservative alternative that easily satisfies the background monitoring requirements.

These monitors are operated by the SC DHEC in support of National Ambient Air Quality Standards attainment activities and meet the quality assurance requirements for this work. These activities require the data to be quality assured, and the level of quality assurance for these monitors meets the requirements for PSD modeling.

Therefore, it has been determined that the data DHEC has obtained for background concentrations are representative of the ambient pollutant concentrations in the area of the proposed facility. In accordance with Chapter C, Section III of the New Source Review Manual (Draft document, dated October 1990), the Bureau approves the use of ambient data collected at DHEC monitoring stations for pre-construction monitoring requirements.

A.2. PSD CLASS II FULL IMPACT MODELING ANALYSIS

A Full Impact Analysis is required for any pollutant for which the proposed source's estimated ambient pollutant concentrations meet or exceed the SIL's (determined in Table VI-1). Separate analyses are performed for determining compliance with the NAAQS and PSD increments. The NAAQS analysis must also include background pollutant concentrations. The Full Impact Analysis consists of modeling all facilities within the SIA, and those in the SA, which are not excluded by the screening protocol. The SA used is an area extending 50 km beyond the SIA for each pollutant and averaging period.

Since no pollutant concentrations exceeded the respective SILs, this project is not subject to Full Impact Modeling.

B. Additional Impacts Analysis – Growth, Soils and Vegetation, and Visibility Impairment

PSD review requires an analysis of any potential impairment to visibility, soils, and vegetation that may occur as a result of the proposed or modified facility/sources. The review also requires an analysis of the air quality impact projected for the area as a result of general commercial, residential, industrial, and other growth associated with the expansion.

B.1. Growth

The SC PSD rules require the applicant to provide information relating to the nature and extent of air quality impacts from all commercial, residential, industrial and other growth, which has occurred since August 7, 1977, in the area the facility, or modification, would affect. For the purposes of this report, the area the facility would affect is defined as the area of significant impact. Since this project does not require development of a significant impact area, and the proposed modification at the facility is not anticipated to result in any significant increase in full-time employment (an associated increase in traffic flow) at the facility. The construction activity related to the project may require a temporary increase in local traffic due to construction related jobs and associated traffic, but the construction and modification of the facility and any workforce growth associated residential and commercial growth is not expected to cause or contribute a quantifiable adverse impact on local ambient air quality.

B.2. Soils and Vegetation

Maximum predicted offsite impacts (highest first high) were compared to EPA screening levels or secondary NAAQS. CO at the predicted levels of concentration for this project does not have any known effects on soils or vegetation. Consequently, no effects on soils or vegetation would be expected from the project.

Table VI-3. SOILS AND VEGETATION ANALYSIS								
Pollutant	Averaging Time	Model Used	MAX. Impact ($\mu g/m^3$)	Back-ground ($\mu g/m^3$)	Facility / Regional Impact ($\mu g/m^3$) (2)	EPA Screening Concentration ($\mu g/m^3$)	AAQS Standard ($\mu g/m^3$)	Exceeds?
CO	1 Week (4)	AERMOD	83 (1)	745.4	815	1,800,000	N/A	No
1) Concentrations include only the facility impacts since they either did not exceed the Significant Impact Levels or none were available. All other values include full impact sources.								
2) Results include background values when available.								
3) Non-Standard Averaging period was conservatively estimated as follows: 1 Week CO = 8-hour concentration compared to weekly standard. Background is also 8-hr value.								

B.3. Visibility

This visibility impairment analysis is distinct from the Class I visibility impact analysis. VISCREEN can be used following the guidelines published in the *Workbook for Plume Visual Impact Screening and Analysis* (EPA-450/4-88-015, 1988). The procedure consists of a screening process done through several levels. A nearby sensitive receptor, such as a state park or local airport, is analyzed to determine if an impact is expected.

This project triggers PSD air quality evaluation requirements for CO and VOCs only. Neither of these pollutants is typically understood to affect visibility so no visibility impairment assessment is needed or was undertaken (i.e. the VISCREEN model used for visibility analysis does not have inputs for CO or VOC).

C. PSD Class I Impact Analysis

A facility within 100 km of a Class I area must perform Class I modeling to determine the impact on the Class I area. For the visibility and deposition analyses, the recommendations in the; 1) *Interagency Workgroup on Air Quality Modeling Phase II Summary Report and Recommendations for Modeling Long Range Transport Impacts (IWAQM)* (EPA-454/R-98-019, December 1998); 2) *Federal Land Managers' Air Quality Related Values Workgroup Phase I Report (FLAG 2010)* (U.S. Forest Service- Air Quality Program, the National Park Service – Air Resources Division, and the U.S. Fish & Wildlife Service – Air Quality Branch, December 2000); 3) *Regional Haze Regulations and Guidelines for Best Available Retrofit Technology* (U.S. EPA, June 15, 2005); and 4) U.S. EPA's *Guidelines on Air Quality Models (Guideline)*, are to be followed.

The 2010 FLAG document allows the screening of sources based on total emissions of certain pollutants and distance from the source to the Class I area. When a source is screened out with $Q/D \leq 10$ (where D = distance from the source to the Class I area in kilometers; Q = TPY of SO_2 + NO_x + PM_{10} + H_2SO_4), the facility is not required to do an AQRV analysis. Additional information provided in public comment responses clarified that for modified sources, applicants should only consider the emissions increases associated with the proposed project modification when calculating Q/D.

For this project, the source was below the screening level and no AQRV analysis was required. [$Q/D = 1.6 \leq 10$ where D = 21.6 kilometers and Q = 34.6 TPY (SO_2 = 0.2, NO_x = 27.8, PM_{10} = 6.6, and H_2SO_4 = 0)] [NOTE: These values were updated based in the July 2014 application. The initial FLM evaluation was based on the April 2013 application which had a Q/D value of 1.5. Both are still well below the screening value of 10]

C.1. CLASS I VISIBILITY ANALYSIS

This project triggers PSD air quality evaluation requirements for CO and VOCs only. Neither of these pollutants is typically understood to affect visibility so no visibility impairment assessment is needed or was undertaken (i.e. the VISCREEN model used for visibility analysis does not have inputs for CO or VOC).

C.4. CLASS I DEPOSITION ANALYSIS

Since the facility screened out of the Class I AQRV analysis based on their Q/D calculation, and since there were no sulfate or nitrate emissions above the triggering threshold for the PSD review, analyses for visibility and deposition are not required.

D. South Carolina Facility-wide Compliance Demonstration

All minor and major sources proposing new construction or construction modifications in South Carolina are required to demonstrate compliance with South Carolina Regulation No. 62.5 Standards Nos. 2 (NAAQS), 7 (Class II PSD Increment), and 8 (Air Toxics). Standard No. 7 (PSD) Part k - "Source Impact Analysis" and Part p - "Sources Impacting Federal Class I Areas - Additional Requirements" require Class II modeling. Facility-wide emissions from the facility only were modeled to demonstrate compliance with Standards 2, 7, and 8.

Table VI-4. STANDARD NO. 2 - AMBIENT AIR QUALITY STANDARDS MODELING ANALYSIS

Pollutant	Averaging Time	Model Used	Maximum Modeled Concentration ($\mu g/m^3$) (1)	Background Concentration ($\mu g/m^3$)	Total ($\mu g/m^3$)	Standard ($\mu g/m^3$)	% of Standard
PM_{10}	24 Hour	ISCST3	29.3	38	67	150	45
$PM_{2.5}$	24 Hour	n/a	(2)	--	(2)	35	--
	Annual	n/a	(2)	--	(2)	15	--
SO_2	3 Hour	ISCST3	138.1	130.9	269	1300	21
	24 Hour	ISCST3	49.4	18.3	68	365	19
	Annual	ISCST3	5.8	4.7	11	80	14
NO_2	Annual	ISCST3	20.0	19.0	39	100	39
CO	1 Hour	AERMOD	**217**	**1870**	**2087**	40,000	5
	8 Hour	AERMOD	**83**	**1374**	**1457**	10,000	15

1) The highest-first-high modeled concentration was used for annual averaging periods and the highest-second-high was used for all other averaging periods, except where noted otherwise.

2) The PM10 surrogate was used to demonstrate compliance with the PM2.5 standards.

9/30/2014 - PSD SIL modeling for CO was based only on project emissions which are the new potentials for the sources affected by this project. The other sources not part of this project are all exempt for CO, so the PSD modeling is the new State modeling. Some of the revised sources are also below the 10 lb/hr exemption threshold, but were included with the project modeling.

Table VI-5. BACKGROUND MONITORING DATA ($\mu g/m^3$)

Pollutant	Site Name	County	Year	1-Hr	3-Hr	8-Hr	24-Hr	3-Mo	Annual
PM_{10}	Cape Romain	Charleston	2005				38		
SO_2	Cape Romain	Charleston	2005		130.9		18.3		4.7
NO_2	Jenkins Ave Fire Sta	Charleston	2005						19.0
CO	**Greenville CHD**	**Greenville**	**10-12**	**1870**		**1374**			

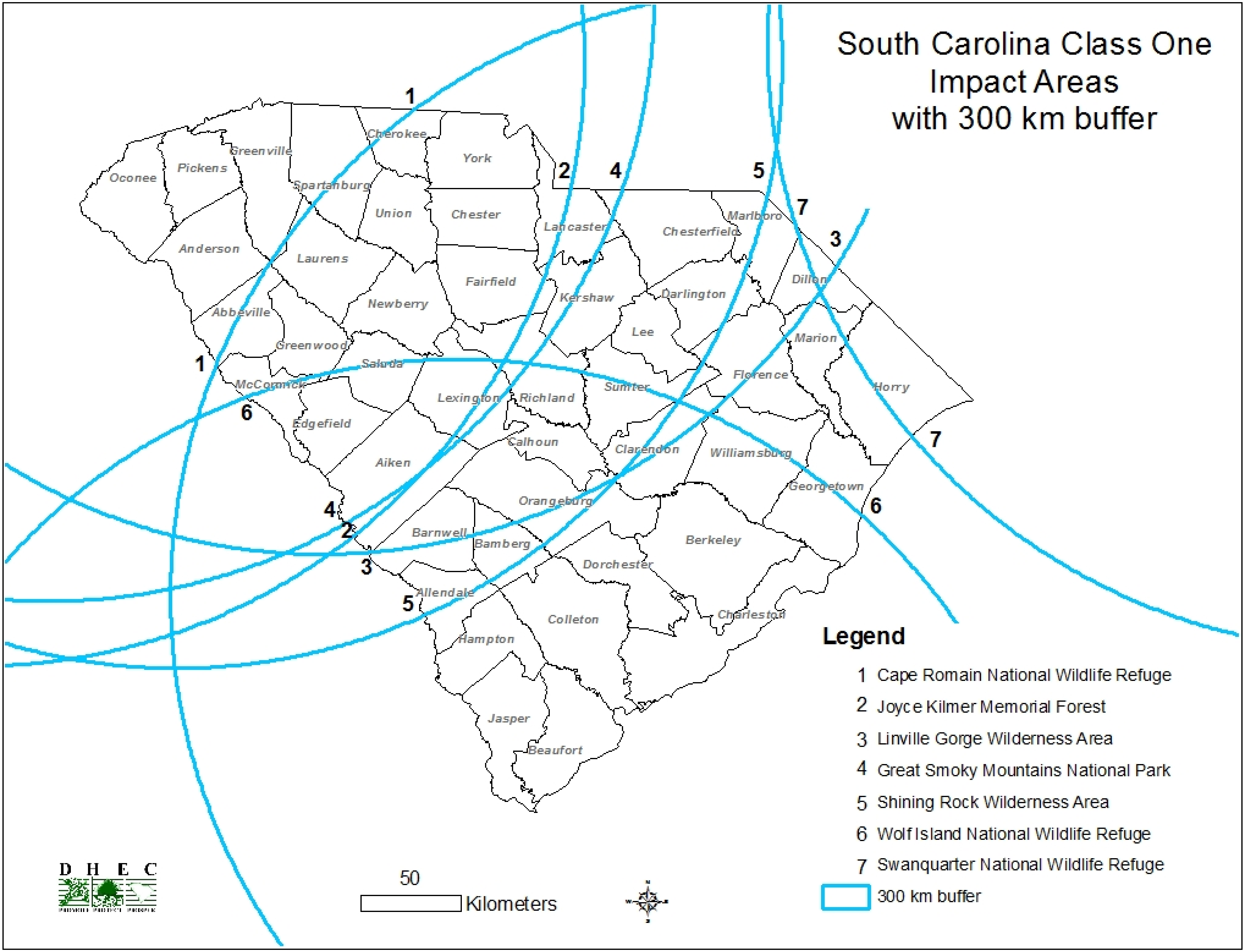
PM10 24-hr is the fourth-high over three year period.
Annual for pollutants other than PM2.5 is the average of the annual averages over the three year period.
All other averaging periods are the average of the three year second-high values.

Table VI-6. STANDARD NO. 7 - CLASS II PSD MODELING ANALYSIS					
Pollutant	Averaging Time	Model Used	Maximum Modeled Concentration ($\mu g/m^3$) [1]	Standard ($\mu g/m^3$)	% of Standard
PM_{10}	24 Hour	ISCST3	6	30	20
	Annual	ISCST3	1	17	6
SO_2	3 Hour	ISCST3	70	512	14
	24 Hour	ISCST3	25	91	27
	Annual	ISCST3	0	20	0
NO_2	Annual	ISCST3	4	25	16
1) The highest-first-high modeled concentration was used for annual averaging periods and the highest-second-high was used for all other averaging periods.					

Since the OX and PTA processes at the facility are subject to the Hazardous Organic NESHAPS MACT, the residual risk analysis has been completed, and will be required to be in compliance with this regulation upon startup of the proposed project, the process is exempt from Standard 8 modeling requirements. Additionally, all sources that emit air toxics at the facility have been determined to be controlled by the HON. Therefore, all Standard 8 modeling has been removed from the summary.

Appendix A

Class I Area Map


South Carolina Class One
Impact Areas
with 300 km buffer
Oconee
Pickens
Greenville
Spartanburg
Cherokee
York
Union
Chester
Anderson
Laurens
Lancaster
Chesterfield
Marlboro
Fairfield
Newberry
Abbeville
Greenwood
Kershaw
Darlington
Dillon
Lee
Marion
Saluda
McCormick
Lexington
Richland
Sumter
Florence
Horry
Edgefield
Calhoun
Clarendon
Williamsburg
Aiken
Orangeburg
Georgetown
Barnwell
Bamberg
Berkeley
Dorchester
Allendale
Colleton
Charleston
Hampton
Jasper
Beaufort
Legend
1 Cape Romain National Wildlife Refuge
2 Joyce Kilmer Memorial Forest
3 Linville Gorge Wilderness Area
4 Great Smoky Mountains National Park
5 Shining Rock Wilderness Area
6 Wolf Island National Wildlife Refuge
7 Swanquarter National Wildlife Refuge
300 km buffer
50
Kilometers
D H E C

Appendix B

Site Location Map

TRC
708 Heartland Trail
Suite 3000
Madison, WI 53717
Phone: 608.826.3600

BP COOPER RIVER
SOUTH CAROLINA

FIGURE 5-1
SITE LOCATION MAP

DRAWN BY:	PAPEZ J
APPROVED BY:	FOX D
PROJECT NO:	187464
FILE NO.	187464-003slm.mxd
DATE:	JANUARY 2013

Appendix C

PSD Permit Application

RECEIVED
AUG 12 2014
BUREAU OF AIR QUALITY

D H E C
PROMOTE PROTECT PROSPER
South Carolina Department of Health and Environmental Control

Bureau of Air Quality
Construction Permit Application
Facility Information

BAQ Use: CP ID: Recv'd By:

A. FACILITY INFORMATION			
1. SC Air Permit Number (8-digits only): 0420 - 0029		2. Application Date: 4/09/2013- Revised 03/04/2014	
3. Facility Name: BP Amoco Chemical Company - Cooper River Plant		4. Facility Federal Tax Identification No.: SCD084703909	
5. Physical Address: 1306 Amoco Dr.			6. County: Berkeley
7. City: Wando		State: SC	8. Zip Code: 29492
9. Facility Coordinates Facility coordinates should be based at the front door or main entrance of the facility.			
Latitude: 604725.47E	Longitude: 3648659.14N		☒ NAD27 or ☐ NAD83

B. COMPANY INFORMATION		
1. Company Name: BP Amoco Chemical Company - Cooper River Plant		
2. Mailing Address: 1306 Amoco Dr.		
3. City: Wando	4. State: SC	5. Zip Code: 29492

C. CO-LOCATION DETERMINATION
Are there other facilities in close proximity that could be considered co-located? ☒ No ☐ Yes**
List potential co-located facilities, including air permit numbers if applicable:
If applicable, location in application for co-location determination:

(**If yes, please submit co-location applicability determination details in an attachment to this application.)

D. CONFIDENTIAL INFORMATION / DATA
Does this application contain confidential information or data? ☐ No ☒ Yes***

(***If yes, include a sanitized version of the application for public review.)

E. COMMUNITY OUTREACH
What are the potential air issues and community concern Based on previous modeling and the modeling attached to this application, there are no potential air issues / community concerns from this project

F. FACILITY'S PRODUCTS / SERVICES	
1. Primary Products / Services: Purified Terephthalic Acid (PTA)	
2. Primary SIC Code: 2869	3. Primary NAICS Code: 325199
4. Other Products / Services:	
5. Other SIC Code(s):	6. Other NAICS Code(s):

G. AIR PERMIT CONTACT (Person who can answer questions about the facility and permit application.)			
Title/Position: Environmental Engineer	Salutation: Mr.	First Name: Brent	Last Name: Pace
Mailing Address: 1306 Amoco Dr.			
City: Wando		State: SC	Zip Code: 29492
E-mail Address: Brent.Pace@bp.com		Phone No.: 843.881.5182	Cell No.: 419.303.3987

The signed permit will be mailed to the Air Permit Contact listed above unless otherwise indicated below. Only one hard copy of the permit will be mailed via the postal service. Additional copies can be sent electronically. Please indicate below any additional individuals who should receive a copy of the permit.

Name	E-mail Address
Michael Doerner	mdoerner@trcsolutions.com

DHEC
PROMOTE PROTECT PROSPER
South Carolina Department of Health and Environmental Control

Bureau of Air Quality
Construction Permit Application
Facility Information

H. OWNER OR OPERATOR			
Title/Position: Plant Manager	Salutation: Mr.	First Name: Mark	Last Name: Fitts
Mailing Address: 1306 Amoco Dr.			
City: Wando		State: SC	Zip Code: 29492
E-mail Address: mark.fitts@bp.com		Phone No.: 843.881.5201	Cell No.:

OWNER OR OPERATOR SIGNATURE

I certify, to the best of my knowledge and belief, that no applicable standards and/or regulations will be contravened or violated. I certify that any application form, report, or compliance certification submitted in this permit application is true, accurate, and complete based on information and belief formed after reasonable inquiry. I understand that any statements and/or descriptions, which are found to be incorrect, may result in the immediate revocation of any permit issued for this application.

M. E. Fitts
Signature of Owner or Operator

8/8/2014
Date

I. AIR PERMIT CONSULTANT (If not the same person as the Professional Engineer.)			
Consulting Firm Name: TRC Environmental Corporation			
Title/Position: Air Quality Specialist	Salutation: Mr.	First Name: Michael	Last Name: Doerner
Mailing Address: 30 Patewood Dr. Suite 300			
City: Greenville		State: SC	Zip Code: 29615
E-mail Address: mdoerner@trcsolutions.com		Phone No.: 864.234.9481	Cell No.: 864.884.2683

J. PROFESSIONAL ENGINEER INFORMATION			
Consulting Firm Name: TRC Environmental Corporation			
Title/Position: Project Manager	Salutation: Mr.	First Name: Robert	Last Name: vandenMeiracker
Mailing Address: 30 Patewood Dr. Suite 300			
City: Greenville		State: SC	Zip Code: 29615
E-mail Address: RVandenMeiracker@trcsolutions.com		Phone No.: 864.234.9177	Cell No.: 864.787.5261
SC License/Registration No.: 28265			

K. LIST OF FORMS INCLUDED

Form Name	Included (Y/N)
Equipment/Processes (DHEC Form 2567)	☒ Yes
Control Devices (DHEC Form 2568)	☒ Yes ☐ No If No; Explain
Emissions (DHEC Form 2569)	☒ Yes
Regulatory Review (DHEC Form 2570)	☒ Yes
Modeling Information (DHEC Form 2573)	☒ Yes ☐ No If No, Explain
Expedited Review Request (DHEC Form 2212)	☒ Yes ☐ No

L. PROFESSIONAL ENGINEER SIGNATURE

I have placed my signature and seal on the engineering documents submitted, signifying that I have reviewed this construction permit application as it pertains to the requirements of *South Carolina Regulation 61-62, Air Pollution Control Regulations and Standards.*

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER NO. 28265 ROBERT FRANCIS vandenMEIRACKER

Signature of Professional Engineer

8/5/2014
Date

DHEC

PROMOTE PROTECT PROSPER
South Carolina Department of Health and Environmental Control

Bureau of Air Quality
Construction Permit Application
Equipment / Processes

A. APPLICATION IDENTIFICATION	
1. Facility Name: BP Amoco Chemical Company - Cooper River Plant	
2. SC Air Permit Number (8-digits only): 0420 - 0029	3. Application Date: 4/09/2013 – Revised 03/04/2014

B. PROJECT DESCRIPTION

Brief Project Description (What, why, how, etc.): #1 and #2 OX units: These units produce Terephthalic Acid (TA) by the air oxidation of p-Xylene (PX) in a acetic acid (HAC) solvent. The TA solid product is crystallized from the solvent, filtered, dried and sent to intermediate storage silos. A more complete description is included in sections 1 and 2 of the application.

C. ATTACHMENTS	
1. ☒ Process Flow Diagram	2. Location in Application: Located in Section 2 of the application
3. ☒ Detailed Project Description	4. Location in Application: Located in Section 1and 2 of the application

D. EQUIPMENT / PROCESS INFORMATION

1. Equipment ID / Process ID	2. Action	3. Equipment / Process Description	4. Maximum Design Capacity (Units)	5. Fuels Combusted	6. Control Device ID(s)	7. Emission Point ID(s)	8. Raw Material(s)	9. Product(s)	10. Pollutant(s)/ Parameter(s) Monitored	11. Monitoring Frequency	12. Reporting Frequency	13. Monitoring / Reporting Basis
#1 OX		**Oxidation Unit**	**Confidential**				**PX/Air**	**TA**				
BR-301A	R	Reactor*	----	N/A	#1 HPVGTS	O-2/10/15	N/A	N/A	----	----	----	----
BR-301B	R	Reactor*	---	N/A	#1 HPVGTS	O-2/10/15	N/A	N/A	----	----	----	----
BR-301C	R	Reactor*	---	N/A	#1 HPVGTS	O-2/10/15	N/A	N/A	----	----	----	----
BR-301D	R	Reactor*	---	N/A	#1 HPVGTS	O-2/10/15	N/A	N/A	----	----	----	----
BT-605	R	Solvent Stripper	---	N/A	N/A	N/A	N/A	N/A	----	----	----	----
BM-606	R	Residue Evaporator	---	N/A	N/A	N/A	N/A	N/A	----	----	----	----
BD-625	R	CRU- Extraction Drum	---	N/A	N/A	O-11	N/A	N/A	----	----	----	----
BD-631	R	CRU - ML Drum	---	N/A	N/A	O-12	N/A	N/A	----	----	----	----
BD-632	R	CRU-Solid Reslurry Drum	---	N/A	N/A	O-13	N/A	N/A	----	----	----	----
BE-645	R	CRU - Condenser	---	N/A	N/A	O-16	N/A	N/A	----	----	----	----
BC-710	R	LPVGT	---	N/A	N/A	N/A	N/A	N/A	----	----	----	----
BR-301	N	Reactor*	---	N/A	#1 HPVGTS	O-2/10/15	N/A	N/A	N/A	N/A	N/A	N/A
BT-701	M	Dehydration Tower	---	N/A	N/A	O-3	N/A	N/A	HON MACT	HON MACT	HON MACT	HON MACT
BD-401	M	1st Crystallizer	---	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BT-603	M	Low Pressure Absorber	---	N/A	N/A	O-3	N/A	N/A	HON MACT	HON MACT	HON MACT	HON MACT
BC-104	M	Power Recovery Expander	---	N/A	N/A	O-2/10/15	N/A	N/A	N/A	N/A	N/A	N/A
BD-200	N	PX Feed Drum	---	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BC-906	N	60# Steam Generator**	**Confidential**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BT-400	M	PX Scrubber	---	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

D H E C
PROMOTE PROTECT PROSPER
South Carolina Department of Health and Environmental Control

Bureau of Air Quality
Construction Permit Application
Equipment / Processes

D. EQUIPMENT / PROCESS INFORMATION

1. Equipment ID / Process ID	2. Action	3. Equipment / Process Description	4. Maximum Design Capacity (Units)	5. Fuels Combusted	6. Control Device ID(s)	7. Emission Point ID(s)	8. Raw Material(s)	9. Product(s)	10. Pollutant(s)/ Parameter(s) Monitored	11. Monitoring Frequency	12. Reporting Frequency	13. Monitoring / Reporting Basis
BT-401	M	HP Absorber	---	N/A	#1 HPVGTS	O-2/10/15	N/A	N/A	HON MACT	HON MACT	HON MACT	HON MACT
BD-604	M	Azeo Storage Drum	---	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BT-700	N	Liquid-Liquid Extraction Tower	---	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BM-1107	N	ROG Chiller	---	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BF-1405	N	NBA Storage Tank	---	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BT-750	N	Entrainer Recovery Tower	---	N/A	N/A	O-3	N/A	N/A	N/A	N/A	N/A	N/A
BD-204	M	Feed Mix Drum	---	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BD-503	M	Filter Vacuum Sep. Drum	---	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BM-1101A/B	M	Off-Gas Dryer	---	N/A	N/A	O-2/10/15	N/A	N/A	N/A	N/A	N/A	N/A
BM-1101C/D	M	Off-Gas Dryer	---	N/A	N/A	O-2/10/15	N/A	N/A	N/A	N/A	N/A	N/A
BM-1201	M	Emergency Generator	400 KW	Diesel	N/A	O-17	N/A	N/A	NSPS IIII	NSPS IIII	NSPS IIII	NSPS IIII
BM-1204	N	Emergency Generator	550 KW	Diesel	N/A	O-24	N/A	N/A	NSPS IIII	NSPS IIII	NSPS IIII	NSPS IIII
#2 OX		**Oxidation Unit**	**Confidential**	**NG**			**PX/Air**	**TA**				
DC-710	R	LPVGT	---	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DT-402	R	Solvent Stripper	---	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DM-403	R	Residue Evaporator	---	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DD-412	R	CRU Extraction Drum	---	N/A	N/A	O2-6	N/A	N/A	N/A	N/A	N/A	N/A
DD-413	R	CRU Slurry Drum	---	N/A	N/A	O2-7	N/A	N/A	N/A	N/A	N/A	N/A
DD-414	R	CRU ML Drum	---	N/A	N/A	O2-8	N/A	N/A	N/A	N/A	N/A	N/A
DE-416	R	CRU Evap OH Condenser	---	N/A	N/A	O2-9	N/A	N/A	N/A	N/A	N/A	N/A
DT-404	R	PX Stripper	---	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
DT-403	M	Dehydration Tower	---	N/A	N/A	O2-1	N/A	N/A	HON MACT	HON MACT	HON MACT	HON MACT
DT-302	M	Low Pressure Absorber	---	N/A	N/A	O2-1	N/A	N/A	HON MACT	HON MACT	HON MACT	HON MACT
DC-104	M	Power Recovery Expander	---	N/A	N/A	O2-3/4	N/A	N/A	N/A	N/A	N/A	N/A
DD-402	M	Azeo Storage Drum	---	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DT-400	N	Liquid-Liquid Extraction Tower	------	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DT-404	N	DHT Scrubber	---	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DF-460	N	NBA Storage Tank	---	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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South Carolina Department of Health and Environmental Control

Bureau of Air Quality
Construction Permit Application
Equipment / Processes

D. EQUIPMENT / PROCESS INFORMATION

1. Equipment ID / Process ID	2. Action	3. Equipment / Process Description	4. Maximum Design Capacity (Units)	5. Fuels Combusted	6. Control Device ID(s)	7. Emission Point ID(s)	8. Raw Material(s)	9. Product(s)	10. Pollutant(s)/ Parameter(s) Monitored	11. Monitoring Frequency	12. Reporting Frequency	13. Monitoring / Reporting Basis
DT-450	N	Entrainer Recovery Tower	---	N/A	N/A	O2-1	N/A	N/A	N/A	N/A	N/A	N/A
DC-906	N	60# Steam Generator**	**Confidential**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
NOTES												
*		Reactor includes overhead condensers										
**		60# Steam Generator will only provide power for internal use.										

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South Carolina Department of Health and Environmental Control

Bureau of Air Quality
Construction Permit Application
Equipment / Processes

A. APPLICATION IDENTIFICATION	
1. Facility Name: BP Amoco Chemical Company - Cooper River Plant	
2. SC Air Permit Number (8-digits only): 0420 - 0029	3. Application Date: 4/09/2013 - Revised 3/04/2014

B. PROJECT DESCRIPTION

Brief Project Description (What, why, how, etc.): #1 and #2 PTA units: These units produce Purified Terephthalic Acid (PTA) by the hydrogenation of the TA in a water slurry to change the impurities into a compound that can be seperated from the TA to improve its purity. The PTA product is separated from the impurities, dried and sent to storage silos. A more complete description is included in sections 1 and 2 of the application.

C. ATTACHMENTS	
1. ☒ Process Flow Diagram	2. Location in Application: Located in Section 2 of the application
3. ☒ Detailed Project Description	4. Location in Application: Located in Section 1and 2 of the application

D. EQUIPMENT / PROCESS INFORMATION

1. Equipment ID / Process ID	2. Action	3. Equipment / Process Description	4. Maximum Design Capacity (Units)	5. Fuels Combusted	6. Control Device ID(s)	7. Emission Point ID(s)	8. Raw Material(s)	9. Product(s)	10. Pollutant(s)/ Parameter(s) Monitored	11. Monitoring Frequency	12. Reporting Frequency	13. Monitoring / Reporting Basis
#1 PTA		**PTA Unit**	**117.5 tph**	**N/A**			**TA/H2**	**PTA**				
CM-301	M	Crystallizer Vent Scrubber	----	N/A	N/A	P-2	N/A	N/A	PM/ Pressure	Daily	Semiannual	CAM Plan
CD-304	N	Crystallizer	----	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
#2 PTA		**PTA Unit**	**88 TPH**	**N/A**			**TA/H2**	**PTA**				
DM-601	M	Crystallizer Vent Scrubber	----	N/A	N/A	P2-2	N/A	N/A	PM/Flow	Continuous	Semiannaul	CAM Plan

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South Carolina Department of Health and Environmental Control

Bureau of Air Quality
Construction Permit Application
Control Devices

A. APPLICATION IDENTIFICATION	
1. Facility Name: BP Amoco Chemical Company - Cooper River Plant	
2. SC Air Permit Number (8-digits only): 0420 - 0029	3. Application Date: 4/09/2013 - Revised 3/04/2014

B. CONTROL DEVICE INFORMATION

1. Control Device ID	2. Action	3. Pollutants Controlled (Include CAS#)	4. Control Device Description	5. Maximum Design Capacity (Units)	6. Fuels Combusted	7. Inherent/ Required/ Voluntary (Explain)	8. Capture System Efficiency and Description	9. Destruction/ Removal Efficiency Determination	10. Pollutant(s)/ Parameter(s) Monitored	11. Averaging Period(s)	12. Monitoring Frequency	13. Reporting Frequency	14. Monitoring/ Reporting Basis
CD – BE-645	R	VOC	Condenser	N/A	N/A	----	----	----	----	----	----	----	----
CD – CM-301	M	PM	Venturi Scrubber	N/A	N/A	R	100-Hard Piped	95-Stack Test	Pressure	N/A	Daily	Semiannual	Per CAM Plan
CD – DE-416	R	VOC	Condenser	N/A	N/A	----	----	----	----	----	----	----	----
CD – DM-601	M	PM	Venturi Scrubber	N/A	N/A	R	100-Hard Piped	95-Stack Test	Flow	N/A	Continuous	Semiannual	Per CAM Plan
CD -													
CD -													
CD -													
CD -													
CD -													
CD -													

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South Carolina Department of Health and Environmental Control

Bureau of Air Quality
Construction Permit Application
Emissions

A. APPLICATION IDENTIFICATION	
1. Facility Name: BP Amoco Chemical Company - Cooper River Plant	
2. SC Air Permit Number (8-digits only): 0420 - 0029	3. Application Date: 4/09/2013-Revised 03/04/2014 and 07/28/2014

B. ATTACHMENTS	
1. ☒ Sample Calculations, Emission Factors Used, etc.	2. ☐ Detailed Explanation of Assumptions, Bottlenecks, etc.
3. ☐ Supporting Information: Manufacturer's Data, etc.	4. ☐ Source Test Information
5. ☐ Details on Limits Being Taken for Limited Emissions	6. ☒ NSR Analysis

C. SUMMARY OF PROJECTED CHANGE IN FACILITY WIDE POTENTIAL EMISSIONS
(Calculated at maximum design capacity.)

1. Pollutants	2. Emission Rates Prior to Construction / Modification (tons/year)			3. Emission Rates After Construction / Modification (tons/year)		
	Uncontrolled	Controlled	Limited	Uncontrolled	Controlled	Limited
Particulate Matter (PM)	5,617.2	81.8	----	5,394.2	77.1	----
Particulate Matter <10 Microns (PM_{10})	5,589.7	78.0	----	5,356.2	73.0	----
Particulate Matter <2.5 Microns ($PM_{2.5}$)	5,522.7	73.8	----	5,261.6	67.9	----
Sulfur Dioxide (SO_2)	193.8	189.1	----	190.9	189.0	----
Nitrogen Oxides (NO_x)	475.9	324.6	----	495.7	324.9	----
Carbon Monoxide (CO)	17,113.9	2,533.8	----	14,820.5	1233.0	----
Volatile Organic Compounds (VOC)	2513.9	761.3	----	2587.2	576.5	----
Lead (Pb)	1.0	1.0	----	1.0	1.0	----
Greenhouse Gases (Mass Basis)	487,767	512,580	----	482,000	479,586	----
Greenhouse Gases (CO_2e Basis)	488,196	513,031	----	484,519	480,031	----
Highest HAP Prior to Construction (CAS #: 106-42-3)	430.8	47.3	----	----	----	----
Highest HAP After Construction (CAS #: 106-42-3)	----	----	----	227.9	58.5	----
Total HAP Emissions*	2,548.4	279.8	----	1688.1	128.6	----

(*All HAP emitted from the various equipment or processes must be listed in the appropriate "Table D. Potential Emission Rates at Maximum Design Capacity.")

D. POTENTIAL EMISSION RATES AT MAXIMUM DESIGN CAPACITY									
1. Equipment ID / Process ID	2. Emission Point ID	3. Pollutants (Include CAS #.)	4. Calculation Methods / Limits Taken / Other Comments	5. Uncontrolled		6. Controlled		7. Limited	
				lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
BM-1201	O-17	NO_X 11104-93-1	See Appendix B	5.86	25.7	5.86	0.3		
BM-1201	O-17	VOC	See Appendix B	0.07	0.3	0.07	0.003		
BM-1201	O-17	CO 630-08-0	See Appendix B	0.37	2.6	0.37	0.03		
BM-1201	O-17	SO_2 7446-09-5	See Appendix B	0.01	0.04	0.01	0.0005		
BM-1201	O-17	PM	See Appendix B	0.06	0.3	0.06	0.003		
BM-1201	O-17	PM_{10}	See Appendix B	0.06	0.3	0.06	0.003		
BM-1201	O-17	$PM_{2.5}$	See Appendix B	0.06	0.3	0.06	0.003		
BM-1201	O-17	CO_2e 124-38-9	See Appendix B	313.1	1371.2	313.1	15.7		
BM-1204	O-23	NO_X 11104-93-1	See Appendix B	9.03	39.6	9.03	0.5		
BM-1201	O-17	VOC	See Appendix B	0.02	0.1	0.02	0.001		
BM-1201	O-17	CO 630-08-0	See Appendix B	0.57	2.5	0.57	0.03		
BM-1201	O-17	SO_2 7446-09-5	See Appendix B	0.01	0.04	0.01	0.0004		
BM-1201	O-17	PM	See Appendix B	0.05	0.2	0.05	0.003		
BM-1201	O-17	PM_{10}	See Appendix B	0.05	0.2	0.05	0.003		
BM-1201	O-17	$PM_{2.5}$	See Appendix B	0.05	0.2	0.05	0.003		
BM-1201	O-17	CO_2e 124-38-9	See Appendix B	302.8	1326.2	302.8	15.1		
#1 HPVGTS	O-2/10/15	VOC	See Appendix B	234	1025	4.7	20.5		
#1 HPVGTS	O-2/10/15	CO 630-08-0	See Appendix B	1758	7700	87.9	385.0		
#1 HPVGTS	O-2/10/15	CO_2e 124-38-9	See Appendix B	9521	41,700	9521	41,700		
BT-603	O-3	VOC	See Appendix B	9.6	42.0	9.6	42.0		
BT-603	O-3	CO 630-08-0	See Appendix B	4.1	18.0	4.1	18.0		

D. POTENTIAL EMISSION RATES AT MAXIMUM DESIGN CAPACITY									
1. **Equipment ID / Process ID**	2. **Emission Point ID**	3. **Pollutants** (Include CAS #.)	4. **Calculation Methods / Limits Taken / Other Comments**	5. **Uncontrolled**		6. **Controlled**		7. **Limited**	
				lbs/hr	**tons/yr**	**lbs/hr**	**tons/yr**	**lbs/hr**	**tons/yr**
BT-603	O-3	CO_2e 124-38-9	See Appendix B	283.0	1240	283.0	1240		
BT-501	O-22	PM	See Appendix B	75	330	1.50	6.6		
BT-501	O-22	PM_{10}	See Appendix B	75	330	1.50	6.6		
BT-501	O-22	$PM_{2.5}$	See Appendix B	75	330	1.50	6.6		
#1 OX Fugitives	N/A	p-Xylene 106-42-3	See Appendix B	1.9	8.1	0.20	0.9		
#1 OX Fugitives	N/A	Formaldehyde 50-00-0	See Appendix B	0	0	0	0		
#1 OX Fugitives	N/A	Methanol 67-56-1	See Appendix B	0.01	0.02	0.001	0.002		
#1 OX Fugitives	N/A	Benzene 71-43-2	See Appendix B	0	0	0	0		
#1 OX Fugitives	N/A	Toluene 108-88-3	See Appendix B	0	0	0	0		
#1 OX Fugitives	N/A	Methyl Bromide 74-83-9	See Appendix B	0	0	0	0		
#1 OX Fugitives	N/A	Acetaldehyde 75-07-0	See Appendix B	0	0	0	0		
#1 OX Fugitives	N/A	Acetic Acid 64-19-7	See Appendix B	45.1	197.5	4.8	21.1		
DM-135	O2-10	NO_X 11104-93-1	See Appendix B	25.75	6.44	25.75	6.44		
DM-135	O2-10	VOC	See Appendix B	0.69	0.17	0.69	0.17		
DM-135	O2-10	CO 630-08-0	See Appendix B	5.90	1.48	5.90	1.48		
DM-135	O2-10	SO_2 7446-09-5	See Appendix B	0.43	0.11	0.43	0.11		
DM-135	O2-10	PM	See Appendix B	0.75	0.19	0.75	0.19		
DM-135	O2-10	PM_{10}	See Appendix B	0.75	0.19	0.75	0.19		
DM-135	O2-10	$PM_{2.5}$	See Appendix B	0.75	0.19	0.75	0.19		

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South Carolina Department of Health and Environmental Control

D. POTENTIAL EMISSION RATES AT MAXIMUM DESIGN CAPACITY									
1. **Equipment ID / Process ID**	2. **Emission Point ID**	3. **Pollutants** (Include CAS #.)	4. **Calculation Methods / Limits Taken / Other Comments**	5. **Uncontrolled**		6. **Controlled**		7. **Limited**	
				lbs/hr	**tons/yr**	**lbs/hr**	**tons/yr**	**lbs/hr**	**tons/yr**
DM-135	O2-10	CO_2e 124-38-9	See Appendix B	440.8	110.2	440.8	110.2		
DB-1813	O2-2	NO_X 11104-93-1	See Appendix B	1.47	6.4	1.47	6.4		
DB-1813	O2-2	VOC	See Appendix B	0.08	0.4	0.08	0.4		
DB-1813	O2-2	CO 630-08-0	See Appendix B	1.24	5.4	1.24	5.4		
DB-1813	O2-2	SO_2 7446-09-5	See Appendix B	0.01	0.04	0.01	0.0		
DB-1813	O2-2	PM	See Appendix B	0.11	0.5	0.11	0.5		
DB-1813	O2-2	PM_{10}	See Appendix B	0.11	0.5	0.11	0.5		
DB-1813	O2-2	$PM_{2.5}$	See Appendix B	0.11	0.5	0.11	0.5		
DB-1813	O2-2	CO_2e 124-38-9	See Appendix B	1755	7,687	175	7,687		
#2 HPVGTS	O2-3/4	VOC	See Appendix B	175.0	766.5	3.50	15.3		
#2 HPVGTS	O2-3/4	CO 630-08-0	See Appendix B	1500.0	6571.5	75.0	329.0		
#2 HPVGTS	O2-3/4	CO_2e 124-38-9	See Appendix B	2300	10,074	2300	10,074		
DT-302	O2-1	VOC	See Appendix B	8.85	38.8	8.85	38.8		
DT-302	O2-1	CO 630-08-0	See Appendix B	3.47	15.2	3.47	15.2		
DT-302	O2-1	CO_2e 124-38-9	See Appendix B	231.7	1,015	231.7	1,015		
DT-500	O2-5	PM	See Appendix B	10	50	0.10	0.5		
DT-500	O2-5	PM_{10}	See Appendix B	10	50	0.10	0.5		
DT-500	O2-5	$PM_{2.5}$	See Appendix B	10	50	0.10	0.5		
#2 OX Fugitives	N/A	p-Xylene 106-42-3	See Appendix B	2.2	9.4	0.2	1.0		
#2 OX Fugitives	N/A	Formaldehyde 50-00-0	See Appendix B	0	0	0	0		

D. POTENTIAL EMISSION RATES AT MAXIMUM DESIGN CAPACITY									
1. Equipment ID / Process ID	2. Emission Point ID	3. Pollutants (Include CAS #.)	4. Calculation Methods / Limits Taken / Other Comments	5. Uncontrolled		6. Controlled		7. Limited	
				lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
#2 OX Fugitives	N/A	Methanol 67-56-1	See Appendix B	0.006	0.03	0.001	0.003		
#2 OX Fugitives	N/A	Benzene 71-43-2	See Appendix B	0	0	0	0		
#2 OX Fugitives	N/A	Toluene 108-88-3	See Appendix B	0	0	0	0		
#2 OX Fugitives	N/A	Methyl Bromide 74-83-9	See Appendix B	0	0	0	0		
#2 OX Fugitives	N/A	Acetaldehyde 75-07-0	See Appendix B	0	0	0	0		
#2 OX Fugitives	N/A	Acetic Acid 64-19-7	See Appendix B	46.2	202.5	4.8	21.2		
CM-301	P-2	VOC	See Appendix B	20.0	87.6	20.0	87.6		
CM-301	P-2	CO	See Appendix B	24.0	105.1	24.0	105.1		
CM-301	P-2	PM	See Appendix B	121	530	1.21	5.3		
CM-301	P-2	PM_{10}	See Appendix B	121	530	1.21	5.3		
CM-301	P-2	$PM_{2.5}$	See Appendix B	121	530	1.21	5.3		
CM-404 A/B	P-3 A/B	PM	See Appendix B	30 each	131.4 each	0.3 each	1.3 each		
CM-404 A/B	P-3 A/B	PM_{10}	See Appendix B	30 each	131.4 each	0.3 each	1.3 each		
CM-404 A/B	P-3 A/B	$PM_{2.5}$	See Appendix B	30 each	131.4 each	0.3 each	1.3 each		
CM-603 A/B	P-4 A/B	PM	See Appendix B	42.4 each	185.8 each	0.42 each	1.9 each		
CM-603 A/B	P-4 A/B	PM_{10}	See Appendix B	42.4 each	185.8 each	0.42 each	1.9 each		
CM-603 A/B	P-4 A/B	$PM_{2.5}$	See Appendix B	42.4 each	185.8 each	0.42 each	1.9 each		
CM-608 A/B	P-17/18	PM	See Appendix B	0.86 each	3.8 each	0.01 each	0.04 each		
CM-608 A/B	P-17/18	PM_{10}	See Appendix B	0.86 each	3.8 each	0.01 each	0.04 each		
CM-608 A/B	P-17/18	$PM_{2.5}$	See Appendix B	0.86 each	3.8 each	0.01 each	0.04 each		
CD-405	P-14	PM	See Appendix B	10	43.8	0.1	0.4		
CD-405	P-14	PM_{10}	See Appendix B	10	43.8	0.1	0.4		
CD-405	P-14	$PM_{2.5}$	See Appendix B	10	43.8	0.1	0.4		
DM-601	P2-2	VOC	See Appendix B	20.0	87.6	20.0	87.6		

D. POTENTIAL EMISSION RATES AT MAXIMUM DESIGN CAPACITY									
1. Equipment ID / Process ID	**2. Emission Point ID**	**3. Pollutants** (Include CAS #.)	**4. Calculation Methods / Limits Taken / Other Comments**	**5. Uncontrolled**		**6. Controlled**		**7. Limited**	
				lbs/hr	**tons/yr**	**lbs/hr**	**tons/yr**	**lbs/hr**	**tons/yr**
DM-601	P2-2	CO	See Appendix B	20.0	87.6	20.0	87.6		
DM-601	P2-2	PM	See Appendix B	54	236.5	0.54	2.4		
DM-601	P2-2	PM_{10}	See Appendix B	54	236.5	0.54	2.4		
DM-601	P2-2	$PM_{2.5}$	See Appendix B	54	236.5	0.54	2.4		
DD-500/DH-518	P2-1	PM	See Appendix B	4	17.5	0.04	0.2		
DD-500/DH-518	P2-1	PM_{10}	See Appendix B	4	17.5	0.04	0.2		
DD-500/DH-518	P2-1	$PM_{2.5}$	See Appendix B	4	17.5	0.04	0.2		
DM-704	P2-3	PM	See Appendix B	5.2	22.8	0.26	1.1		
DM-704	P2-3	PM_{10}	See Appendix B	5.2	22.8	0.26	1.1		
DM-704	P2-3	$PM_{2.5}$	See Appendix B	5.2	22.8	0.26	1.1		
DM-797 A/B	P2-4 A/B	PM	See Appendix B	265 each	1161 each	0.27 each	1.2 each		
DM-797 A/B	P2-4 A/B	PM_{10}	See Appendix B	265 each	1161 each	0.27 each	1.2 each		
DM-797 A/B	P2-4 A/B	$PM_{2.5}$	See Appendix B	265 each	1161 each	0.27 each	1.2 each		

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Bureau of Air Quality
Construction Permit Application
Regulatory Review

A. APPLICATION IDENTIFICATION	
1. Facility Name: BP Amoco Chemical Company - Cooper River Plant	
2. SC Air Permit Number (8-digits only): 0420 - 0029	3. Application Date: 4/09/2013 – Revised 3/04/2014

B. SOUTH CAROLINA AIR POLLUTION CONTROL REGULATIONS AND STANDARDS
(If not listed below add any additional regulations that are triggered.)

1. **Regulation**	2. **Applicable**		**Include all limits, work practices, monitoring, record keeping, etc.**		
	Yes	No	3. **Explain Applicability Determination**	4. **List the specific limitations and/or requirements that apply.**	5. **How will compliance be demonstrated?**
Regulation 61-62.1, Section II(E) Synthetic Minor Construction Permits	☐	☒	Major Source	N/A	N/A
Regulation 61-62.1, Section II(G) Conditional Major Operating Permits	☐	☒	Title V Source	N/A	N/A
Regulation 61-62.5, Standard No. 1 Emissions from Fuel Burning Operations	☐	☒	No new or modified fuel burn sources	N/a	N/A
Regulation 61-62.5, Standard No. 2 Ambient Air Quality Standards	☒	☐	No changes to PTE previously modeled, CO modeling below SIL	N/A	N/A
Regulation 61-62.5, Standard No. 3 Waste Combustion and Reduction	☐	☒	No new or modified sources	N/A	N/A
Regulation 61-62.5, Standard No. 3.1 Hospital, Medical, Infections Waste Incinerators (HMIWI)	☐	☒	No applicable sources at facility	N/A	N/A
Regulation 61-62.5, Standard No. 4 Emissions from Process Industries	☒	☐	PM sources- the PWR is unchanged	No Change from present	No Change from present
Regulation 61-62.5, Standard No. 5 Volatile Organic Compounds	☐	☒	No new or modified sources	N/A	N/A
Regulation 61-62.5, Standard No. 5.1 BACT/LAER Applicable to VOC	☒	☒	VOC increase is less than 100 tpy per PSD analysis	N/A	N/A
Regulation 61-62.5, Standard No. 5.2 Control of Oxides of Nitrogen	☐	☒	No new or modified sources	N/A	N/A
Regulation 61-62.5, Standard No. 7 Prevention of Significant Deterioration	☒	☐	PSD Permit application		
Regulation 61-62.5, Standard No. 7.1 Nonattainment New Source Review	☐	☒	Not a non-attainment area	N/A	N/A
Regulation 61-62.5, Standard No. 8 Toxic Air Pollutants	☐	☒	Exempt per section 1(d) since all sources covered by a MACT	N/A	N/A

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South Carolina Department of Health and Environmental Control

Bureau of Air Quality
Construction Permit Application
Regulatory Review

B. SOUTH CAROLINA AIR POLLUTION CONTROL REGULATIONS AND STANDARDS
(If not listed below add any additional regulations that are triggered.)

1. **Regulation**	2. **Applicable**		**Include all limits, work practices, monitoring, record keeping, etc.**		
	Yes	**No**	3. **Explain Applicability Determination**	4. **List the specific limitations and/or requirements that apply.**	5. **How will compliance be demonstrated?**
Regulation 61-62.6 Control of Fugitive Particulate Matter	☐	☒	No new or modified sources	N/A	N/A
Regulation 61-62.68 Chemical Accident Prevention Provisions	☐	☒	No new or modified sources	N/A	N/A
Regulation 61-62.70 Title V Operating Permit Program	☒	☐	Title V Modification	Revise Title V permit	Submit application
Regulation 61-62.72 Acid Rain	☐	☒	No new or modified sources	N/A	N/A
Regulation 61-62.96 Nitrogen Oxides Budget Trading Program	☐	☒	No new or modified sources	N/A	N/A
Regulation 61-62.99 Nitrogen Oxides Budget Program Requirements for Stationary Sources Not In the Trading Program	☐	☒	No new or modified sources	N/A	N/A

C. 40 CFR PART 60 - STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES
(If not listed below add any additional regulations that are triggered.)

1. **Subpart and Title**	2. **Applicable**		**Include all limits, work practices, monitoring, record keeping, etc.**		
	Yes	**No**	3. **Explain Applicability Determination**	4. **List the specific limitations and/or requirements that apply.**	5. **How will compliance be demonstrated?**
Subpart A - General Provisions	☒	☐	New or modified sources subject		
NNN	☒	☐	New sources	Maintain TRE from recovery device above 8	Monitor recovery per regulation to maintain TRE
III	☒	☐	New reactor on #1 OX	Maintain TRE from recovery device above 4	Monitor recovery per regulation to maintain TRE
VV	☒	☐	New components	Will comply by HON LDAR	HON LDAR monitoring
VVa	☐	☐	New components	Will comply by HON LDAR	HON LDAR monitoring
	☐	☐			
	☐	☐			
	☐	☐			
	☐	☐			

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D. 40 CFR PART 61 - NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS
(If not listed below add any additional regulations that are triggered.)

1. **Subpart and Title**	2. **Applicable**		**Include all limits, work practices, monitoring, record keeping, etc.**		
	Yes	**No**	3. **Explain Applicability Determination**	4. **List the specific limitations and/or requirements that apply.**	5. **How will compliance be demonstrated?**
Subpart A - General Provisions	☐	☒	No new or modified sources	N/A	N/A
M	☐	☐	General for facility demo work	Proper handling of asbestos	Proper handling methods
FF	☐	☐	Need to re-evaluate TAB	Re-evaluate TAB < 1 Mg	TAB calculation
	☐	☐			
	☐	☐			

E. 40 CFR PART 63 - NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS FOR SOURCE CATEGORIES
(If not listed below add any additional regulations that are triggered.)

1. **Subpart and Title**	2. **Applicable**		**Include all limits, work practices, monitoring, record keeping, etc.**		
	Yes	**No**	3. **Explain Applicability Determination**	4. **List the specific limitations and/or requirements that apply.**	5. **How will compliance be demonstrated?**
Subpart A - General Provisions	☒	☐	New or modified sources		
F		☐	New or modified sources		
G	☒	☐	New or modified sources	Maintain TRE of process vents	Monitor per HON regulation
H	☒	☐	New or modified sources	Have a LDAR program	Monitor & Report per HON
DDDDD	☒	☐	Applicable to equipment but no new or modified sources	No new limits or requirements	Burn only gas
GGGGG	☒	☐	Will be triggered if remediation occurs due to project	Comply with appropriate standards	Meet appropriate monitoring and reporting requirement of regulation
	☐	☐			
	☐	☐			

F. OTHER
(If not listed below add any additional regulations, enforcement requirement, permitting requirement, etc. that are triggered.)

1. **Regulation and Title / Other**	2. **Applicable**		**Include all limits, work practices, monitoring, record keeping, etc.**		
	Yes	**No**	3. **Explain Applicability Determination**	4. **List the specific limitations and/or requirements that apply.**	5. **How will compliance be demonstrated?**
40 CFR Part 64 - Compliance Assurance Monitoring (CAM)	☒	☐	New or modified sources	Update CAM plan as necessary	Monitor per CAM plan & report
	☐	☐			

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Bureau of Air Quality
Modeling Information

A. APPLICATION IDENTIFICATION	
1. Facility Name: BP Amoco Chemical Company - Cooper River Plant	
2. SC Air Permit Number (if known; 8-digits only): 0420 - 0029	3. Application Date: 4/09/2013 – Revised 3/04/2014
4. Project Description: BP CR Modernization/Debottleneck Project	

B. FACILITY INFORMATION	
1. Is your company a Small Business? ☐ Yes ☒ No	2. If a Small Business, is Bureau modeling assistance being requested? ☐ Yes ☒ No
3. Are other facilities co-modeled? ☐ Yes ☒ No	4. If Yes, provide permit numbers of co-modeled facilities:

C. AIR MODELING CONTACT			
Consulting Firm Name (if applicable): TRC Environmental			
Title/Position: Senior Environmental Specialist	Salutation: Mr.	First Name: David	Last Name: Fox
Mailing Address: Suite 3000 708 Heartland Trail			
City: Madison		State: Wi	Zip Code: 53717
E-mail Address: DFox@trcsolutions.com		Phone No.: 608-826-3622	Cell No.: 608-216-8986

D. REASON FOR MODELING
(Check all that apply.)

1. ☐ Modeling Not Required Explanation:

2. **Modeling/Pollutant**	**Particulate Matter <10 Microns (PM_{10})**	**Particulate Matter <2.5 Microns ($PM_{2.5}$)**	**Sulfur Dioxide (SO_2)**	**Nitrogen Oxides (NO_x)**	**Carbon Monoxide (CO)**	**Lead (Pb)**	**Hydrogen Fluoride (HF)**	**Air Toxics**	**Other**
Not Modeled	☒	☒	☒	☒	☐	☒	☒	☒	☐
Standard 2 AAQS	☐	☐	☐	☐	☐	☐	☐	N/A	☐
Standard 2 Exemption/Deferral	☐	☐	☐	☐	☐	☐	☐	N/A	☐
Standard 7 Increment	☐	☐	☐	☐	N/A	N/A	N/A	N/A	☐
Standard 7 Exemption/Deferral	☐	☐	☐	☐	N/A	N/A	N/A	N/A	☐
Standard 8 Air Toxics	N/A	N/A	N/A	N/A	N/A	N/A	N/A	☐	☐
Standard 8 De Minimis / Exempt	N/A	N/A	N/A	N/A	N/A	N/A	N/A	☐	☐
NSR/PSD Project	☐	☐	☐	☐	☒	☐	☐	☐	☐
Air Compliance Demonstration	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other	☐	☐	☐	☐	☐	☐	☐	☐	☐

3. "Other" Reason for modeling	

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Bureau of Air Quality
Modeling Information

E. EMISSION SOURCE DISPERSION PARAMETERS

Source data requirements are based on the appropriate source classification. Each emission source is classified as a point, area, volume, or flare source. Contact the Bureau of Air Quality for clarification of input data requirements. Include source on-site map. Also, a picture of area or volume sources would be helpful but is not required. A spreadsheet may be substituted in lieu of this form provided the required emission point parameters are submitted in the same order as presented in these tables.

Abbreviations / Units of Measure: UTM = Universal Transverse Mercator; °N = Degrees North; °W = Degrees West; m = meters; AGL = Above Ground Level; ft = feet; ft/s = feet per second; ° = Degrees; °F = Degrees Fahrenheit

F. POINT SOURCE DATA
(Point sources such as stacks, chimneys, exhaust fans, and vents.)

Emission Point ID	Description/Name	Stack Coordinates Projection: UTM83				Release Height AGL (ft)	Temp. (°F)	Exit Velocity (ft/s)	Inside Diameter (ft)	Discharge Orientation	Rain Cap? (Y/N)	Distance To Nearest Property Boundary (ft)	Building		
		UTM E (m)	UTM N (m)	Lat (°N)	Long (°W)								Height (ft)	Length (ft)	Width (ft)
BT_702	BT-702 DHT Scrubber	604625	3649190			35.00	90	69.9	1.00	V	N	964	54	62	51
BT_603	#1 OX LPA	604639	3649127			70.5	120	11.2	2.50	V	N	907	54	62	51
HPVGTS1	#1 Ox HPVGTS	604666.1	3649104.3			100.0	171	261.7	3.0	V	N	878	54	62	51
DT_302	#2 OX LPA	604565	3648820			80.0	95	3.2	3.5	V	N	590	32	44	29
HPVGTS2	#2 OX HPVGTS	604642.3	3648895.9			136.0	140	98.0	4.26	V	N	667	32	44	29

G. AREA SOURCE DATA
(Area sources such as storage piles, and other sources that have low level or ground level releases with no plumes.)

Emission Point ID	Description/Name	Area Source Coordinates Projection:				Release Height AGL (ft)	Easterly Length (ft)	Northerly Length (ft)	Angle From North (°)	Distance To Nearest Property Boundary (ft)
		UTM E (m)	UTM N (m)	Lat (°N)	Long (° W)					
NA										

H. VOLUME SOURCE DATA
(Volume sources that have initial dispersion prior to release. Volume sources differ from area sources in that they have an initial dispersion vertical depth.)

Emission Point ID	Description/Name	Volume Source Coordinates Projection:				Release Height AGL (ft)	Initial Horizontal Dimension (ft)	Initial Vertical Dimension (ft)	Distance To Nearest Property Boundary (ft)
		UTM E (m)	UTM N (m)	Lat (°N)	Long (° W)				
NA							‼ FORMTEXT		

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Bureau of Air Quality
Modeling Information

I. FLARE SOURCE DATA
(Point sources where the combustion takes place at the tip of the stack.)

Emission Point ID	Description/Name	Stack Coordinates Projection:				Release Height AGL (ft)	Heat Release Rate (BTU/hr)	Distance To Nearest Property Boundary (ft)	Building		
		UTM E (m)	UTM N (m)	Lat (°N)	Long (° W)				Height (ft)	Length (ft)	Width (ft)
NA											

J. AREA CIRCULAR SOURCE DATA

Emission Point ID	Description/Name	Area Circular Source Coordinates Projection:				Release Height AGL (ft)	Radius of Area (ft)	Distance To Nearest Property Boundary (ft)
		UTM E (m)	UTM N (m)	Lat (°N)	Long (° W)			
NA								

K. AREA POLY SOURCE DATA

Emission Point ID	Description/Name	Area Poly Source Coordinates Projection:				Release Height AGL (ft)	Number of Vertices
		UTM E (m)	UTM N (m)	Lat (°N)	Long (° W)		
NA				NA (See Instructions)			

L. OPEN PIT SOURCE DATA

Emission Point ID	Description/Name	Open Pit Source Coordinates Projection:				Release Height AGL (ft)	Easterly Length (ft)	Northerly Length (ft)	Volume (ft^3)	Angle From North (°)
		UTM E (m)	UTM N (m)	Lat (°N)	Long (° W)					
NA				NA (See Instructions)						

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M. MODELED EMISSION RATES						
Emission Point ID	Pollutant Name	CAS #	Emission Rate (lb/hr)	Same as Permitted (1)	Controlled or Uncontrolled	Averaging Period
BT-702	CO		-87.0	☒ Yes ☐ No	Controlled	1,8
BT-603	CO		4.1	☐ Yes ☒ No	Controlled	1,8
#1 HPVGTS	CO		87.9	☐ Yes ☒ No	Controlled	1,8
DT-302	CO		3.5	☐ Yes ☒ No	Controlled	1,8
#2 HPVGTS	CO		75.0	☐ Yes ☒ No	Controlled	1,8
				☐ Yes ☐ No		
				☐ Yes ☐ No		
				☐ Yes ☐ No		
				☐ Yes ☐ No		
				☐ Yes ☐ No		

(1) Any difference between the modeled rate and the permitted rate must be explained in the modeling report.

Appendix D

Draft Construction Permit No. 0420-0029-CU

CURRENT DATE

Mr. Brent Pace
BP Amoco Chemical Company - Cooper River Plant
1306 Amoco Drive
Wando, SC 29492

Re: Construction Permit No. 0420-0029-CU

Dear Mr. Pace:

Enclosed is Construction Permit No. 0420-0029-CU. This construction permit is being issued in accordance with the plans, specifications and other information submitted in the construction permit application, as amended.

In addition to this permit to construct, a permit to operate is required in accordance with *South Carolina Regulation 61-62, Air Pollution Control Regulations and Standards*. The regulations require a written request for a new or revised operating permit to cover any new or altered source, postmarked no later than fifteen (15) days after the actual date of initial startup of each new or altered source unless a more stringent time frame is required.

Please note the emissions limitations and operational requirements contained within this permit. It is important for you and/or an authorized representative responsible for the overall operation of this facility to read this issued permit carefully and to understand all requirements. If any errors or omissions are discovered, please notify James C. Robinson of my staff, via e-mail at robinsjc@dhec.sc.gov, or call (803) 898-0660 immediately.

Pursuant to the South Carolina Administrative Procedures Act, any Department decision involving the issuance, denial, renewal, suspension or revocation of a permit may be appealed by the applicant, permittee, licensee, and/or affected persons. Please see the enclosed "Guide to Board Review" for guidelines on filing an appeal.

Sincerely,

Elizabeth J. Basil
Director, Engineering Services Division, Bureau of Air Quality

EJB:jcr:typist's initials lower case

Enclosure

cc: Permit File: 0420-0029

ec: Wendy Boswell, BEHS
Michael Doerner, TRC Environmental Corporation
Michael Shroup, Source Evaluation
Heinz Kaiser, Air Toxics

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PROMOTE PROTECT PROSPER

South Carolina Department of Health and Environmental Control

Office of Environmental Quality Control
Bureau of Air Quality
PSD Construction Permit

BP Amoco Chemical Company-Cooper River Plant
1306 Amoco Drive
Wando, SC 29492
Berkeley County

Pursuant to the provisions of the *Pollution Control Act*, Sections 48-1-50(5) and 48-1-110(a), the 1976 *Code of Laws of South Carolina*, as amended, and *South Carolina Regulation 61-62, Air Pollution Control Regulations and Standards*, the Bureau of Air Quality authorizes the construction of this facility and the equipment specified herein in accordance with the plans, specifications, and other information submitted in the construction permit application received on April 11, 2013, as amended. All official correspondence, plans, permit applications, and written statements are an integral part of the permit. Any false information or misrepresentation in the application for a construction permit may be grounds for permit revocation.

The construction and subsequent operation of this facility is subject to and conditioned upon the terms, limitations, standards, and schedules contained herein or as specified by this permit and its accompanying attachments.

Permit Number: **0420-0029-CU**
Issue Date: **ISSUED DATE**

____

Director, Engineering Services Division
Bureau of Air Quality

A. PROJECT DESCRIPTION

Permission is hereby granted to modify the #1 and #2 Oxidation (OX) Units to remove limitations that prevent the units from operating at their design capacities (debottlenecking); and to make minor modifications to the #1 and #2 Purified Terephthalic Acid (PTA) Units to reduce operating costs. In general, these modifications will include improvements to the reaction environment, additional reaction air capacity, optimization of the recovery systems, improved Dehydration Tower (DHT) operation, improved energy recovery, removal of several emission points, addition of dense phase conveying and additional cooling tower capacity. These changes will result in increased actual hourly production and emissions rates, but will not increase maximum production rates or potential emission rates. This project is referred to as the OX Modernization/Debottleneck project.

The specific equipment revisions, additions, and removals included in the proposed project are as follows:

1. #1 OX unit
   - Replacement of the four existing reactors (BR-301 A-D) with a new single more efficient reactor (BR-301)
   - Replacement of the reactor overhead condenser system
   - Replacement of the air compressor rotor to reduce energy consumption
   - Direct injection of Paraxylene (PX) to the new reactor
   - Additional reactor overhead recovery capacity by replacing equipment with an improved design
   - Routing of 1st crystallizer (BD-401) vent to reactor off-gas recovery system
   - Maintain power recovery in off-gas expander by lowering upstream pressure drop
   - Conversion of dehydration tower (DHT) to azeotropic distillation unit
   - Change DHT overhead recovery system to a two-stage system by:
     - Converting existing DHT Scrubber (BT-702) to a one-stage acid scrubber
     - Routing the DHT Scrubber vent to the Low Pressure Absorber (LPA) (BT-603)
     - Revising the packing in the LPA
   - Change High Pressure Absorber (T-401) internal packing
   - Addition of dense phase conveying (conveyance of solids with less carrier gas)
   - Additional capacity for filters
   - Removal of the low pressure vent gas treatment (LPVGT) compressor (BC-710)
   - Removal of the solvent stripper (BT-605)
   - Removal of the residue evaporator (BM-606) and catalyst recovery unit (BD-625/631/632/BE-645)
   - Removal of the PX Stripper (BT-740)
   - Addition of a steam turbine to generate power from excess low pressure steam
   - Addition of a fixed roof NBA storage tank,
   - New replacement of existing Emergency Generator (BM-1201)
   - Addition of a new Emergency Generator (BM-1204)

2. #1 PTA unit
   - Revisions to crystallizer vent scrubber (CM-301) to improve energy recovery
   - Addition of a 5th crystallizer (CD-300)
   - Addition of dense phase conveying
   - Replacement of dryer (CM-403B)

3. #2 OX unit
   - Direct injection of PX to reactor
   - Re-rating (Modification) of air compressor for additional capacity
   - Replacement of reactor overhead condenser
   - Conversion of dehydration tower (DHT) (DT-403) to an azeotropic distillation unit
   - Modification of packing or trays in DHT (DT-403), High Pressure Absorber (HPA) (DT-111), LPA (DT-302), Dryer Scrubber (DT-301) and High Pressure Vent Gas Treatment System (HPVGTS) Scrubber (DT-1821)
   - Routing of DHT (DT-403) vent to LPA system (DT-302)
   - Addition of dense phase conveying

- Removal of Low Pressure Vent Gas Treatment (LPVGT) System compressor (DC-304)
- Removal of solvent stripper (DT-402) system
- Removal of the residue evaporator (DM-403) and catalyst recovery unit (DD-412/413/414/DE-416)
- Removal of PX Stripper (DT-404)
- Addition of a steam turbine to generate power from excess steam
- Addition of a fixed roof NBA storage tank,

4. #2 PTA Unit
   - Modifications to crystallizer vent scrubber (DM-601) to improve energy recovery
   - Modification of piping system from PTA Feed Drum (DD-500) to the Sundyne pumps
   - Addition of a 4th Sundyne pump
   - Addition of dense phase conveying
   - Replacement of dryer (DM-703)

5. Cooling Towers
   - Additional #1 Cooling Tower capacity
   - Additional #2 Cooling Tower capacity

The project will also include smaller items that will occur on all the units in the following general categories:

1. Additional and/or improved automation, multivariable control schemes, and on-line analyzers to increase unit reliability and improve process control.
2. Replacement of process equipment and piping that are negatively impacting maintenance costs and unit reliability.
3. Replacement of obsolete or end-of-life equipment such as piping, instruments, and computer equipment, where replacement parts are no longer available and equipment that has been determined to be too worn or corroded.
4. Replacement of exchangers and vessels to improve metallurgy, reduce corrosion, and reduce maintenance costs.

As part of this project, BP Amoco – Cooper River Plant (BPCR) is removing synthetic minor PSD avoidance limits that were established in construction permits 0560-0029-CF, -CJ, -CP, and -CR for the following emission points: #1 OX DHT Scrubber, #1 and #2 OX LPA's, #1 and #2 OX HPVGTS, #2 PTA Crystallizer Vent Scrubber, #2 OX HPVGTS Heater, and the combined limit for CR#1 and CR#2 Plants. The table below lists the individual synthetic minor limits that will be removed. These emission points have been included in the BACT analysis.

Synthetic Minor Limits To Be Removed						
OP ID	**CP ID(s)**	**Process/Equipment (Equipment ID)**	**Pollutant**	**Emission Limitation (lb/hr)**	**Emission Limitation (TPY)**	**Proposed BACT Limit (lb/hr)**
03	CP & CR	#1 OX LPA (BT-603)	VOC	40	80	9.6
03	CR	#1 OX LPA (BT-603)	CO	N/A	40	4.1
03	CP & CR	#1 OX DHT Scrubber (BT-702)	VOC	60	165	N/A[1]
03	CR	#1 OX DHT Scrubber (BT-702)	CO	N/A	380	
03	CJ & CR	#1 OX HPVGTS (HPA (BT-401))	VOC	85	80	4.7
03	CJ & CR	#1 OX HPVGTS (HPA (BT-401))	CO	1452	375	87.9
05	CF[2]	#2 OX LPA (DT-302)	VOC	15.57	N/A	8.85
		#2 OX HPVGTS (HPA (DT-111))				3.5
05	CF[2]	#2 PTA Unit Crystallizer Vent Scrubber (DM-601)	VOC	25.6	N/A	20.0

05	CF(2)	#2 OX Fugitives	VOC	3.5	N/A	HON LDAR
05	CF(2)	#2 OX HPVGTS Fired Heater	VOC	0.84	N/A	0.0055 lb/MM BTU
03-06	CP	Combined total for CR#1 & CR#2	VOC	N/A	1825	Replaced with individual vent limits

(1) The #1 OX DHT Scrubber will no longer vent to the atmosphere and is being routed to the #1 OX LPA. The #1 OX LPA BACT limit accounts for the #1 OX DHT Scrubber emissions.

(2) Construction Permit 0420-0029-CF established a total PSD avoidance limit of 49.26 lb VOC/hr for the Cooper River #2 Plant. This limit consisted of these four sources of emissions, and the following sources of emissions: Incremental increase from the Tank Farm (0.02 lb/hr) and Wastewater Fugitives (3.11 lb/hr), the Anaerobic Reactor (0.31 lb/hr), and the CO_2 Stripper (0.35 lb/hr). A revised PSD avoidance SM limit established through construction permit 0420-0029 will be the sum of the emissions from the Tank Farm, Wastewater Fugitives, Anaerobic Reactor, and CO_2 Stripper (3.79 lb/hr).

B.1 EQUIPMENT FOR #1 OXIDATION UNIT (TV PERMIT UNIT ID 03)

Equipment ID	Equipment Description	Control Device ID	Emission Point ID
BR-301	Reactor with Overhead Condensers*	#1 HPVGTS	O-2/10/15
BD-200	PX Feed Drum*	N/A	N/A
BC-906	60# Steam Generator*	N/A	N/A
BT-700	Liquid-Liquid Extraction Tower*	N/A	N/A
BF-1405	NBA Storage Tank* (Specific Tank Size TBD)	N/A	N/A
BT-750	Entrainer Recovery Tower* (ERT)	N/A	O-3
BM-1201	400 kW Emergency Generator*	N/A	O-17
BM-1204	500 kW Emergency Generator*	N/A	O-24
BT-701	Dehydration Tower (DHT)	N/A	O-3
BD-401	1st Crystallizer	N/A	N/A
BT-603	Low Pressure Absorber (LPA)	N/A	O-3
BC-104	Power Recovery Expander	N/A	O-2/10/15
BT-400	PX Scrubber	N/A	N/A
BT-401	High Pressure Absorber (HPA)	#1 HPVGTS	O-2/10/15
BD-604	Azeo Storage Drum	N/A	N/A
BD-204	Feed Mix Drum	N/A	N/A
BD-503	Filter Vacuum Sep. Drum	N/A	N/A
BM-1101A/B	Off-Gas Dryer	N/A	O-2/10/15
BM-1101C/D	Off-Gas Dryer	N/A	O-2/10/15

* These equipment are new. All other equipment listed is being modified.

B.2 EQUIPMENT FOR #1 PURIFIED TEREPHTHALIC ACID UNIT (TV PERMIT UNIT ID 04)

Equipment ID	Equipment Description	Control Device ID	Emission Point ID
CD-300	Crystallizer	CM-301	P-2
CM-403B	Dryer	N/A	P-3B

B.3 EQUIPMENT FOR #2 OXIDATION UNIT (TV PERMIT UNIT ID 05)

Equipment ID	Equipment Description	Control Device ID	Emission Point ID
DT-400	Liquid-Liquid Extraction Tower*	N/A	N/A
DF-460	NBA Storage Tank* (Specific Tank Size TBD)	N/A	N/A
DT-450	Entrainer Recovery Tower* (ERT)	N/A	O2-1
DC-906	60# Steam Generator*	N/A	N/A
DT-403	Dehydration Tower (DHT)	N/A	O2-1
DT-302	Low Pressure Absorber (LPA)	N/A	O2-1
DC-104	Power Recovery Expander	N/A	O2-3/4
DD-402	Azeo Storage Drum	N/A	N/A

* These equipment are new. All other equipment listed is being modified.

C. CONTROL DEVICES

Control Device ID	Control Device Description	Pollutant(s) Controlled
#1 HPVGTS	#1 Oxidation Unit High Pressure Vent Gas Treatment System (Catalytic Oxidizer (CTO) (BR-1814) followed by a Scrubber)	VOC, HAP, CO
#2 HPVGTS	#2 Oxidation Unit High Pressure Vent Gas Treatment System (CTO (DR-1814) followed by a Scrubber)	VOC, HAP, CO
CM-301	Venturi Scrubber; called #1 Crystallizer Vent Scrubber (CVS)	$PM/PM_{10}/PM_{2.5}$
DM-601	Venturi Scrubber; called #2 Crystallizer Vent Scrubber (CVS)	$PM/PM_{10}/PM_{2.5}$

D. LIMITATIONS, MONITORING AND REPORTING CONDITIONS

Condition Number	Conditions
D.1	**Equipment/Control Device ID:** All (S.C. Regulation 61-62.1, Section II.J.1.g) A copy of the Department issued construction and/or operating permit must be kept readily available at the facility at all times. The owner or operator shall maintain such operational records; make reports; install, use, and maintain monitoring equipment or methods; sample and analyze emissions or discharges in accordance with prescribed methods at locations, intervals, and procedures as the Department shall prescribe; and provide such other information as the Department reasonably may require. All records required to demonstrate compliance with the limits established under this permit shall be maintained on site for a period of at least 5 years from the date the record was generated and shall be made available to a Department representative upon request.

D. LIMITATIONS, MONITORING AND REPORTING CONDITIONS

Condition Number	Conditions
D.2	**Equipment/Control Device ID:** All The owner/operator shall maintain on file all measurements including continuous monitoring system or monitoring device performance measurements; all continuous monitoring system performance evaluations; all continuous monitoring system or monitoring device calibration checks; adjustments and maintenance performed on these systems or devices; and all other information required in a permanent form suitable for inspection by Department personnel.
D.3	**Equipment/Control Device ID:** All All gauges shall be readily accessible and easily read by operating personnel and Department personnel (i.e. on ground level or easily accessible roof level). Monitoring parameter readings (i.e., pressure drop readings, etc.) and inspection checks shall be maintained in logs (written or electronic), along with any corrective action taken when deviations occur. Each incidence of operation outside the operational ranges, including date and time, cause, and corrective action taken, shall be recorded and kept on site. Exceedance of operational range shall not be considered a violation of an emission limit of this permit, unless the exceedance is also accompanied by other information demonstrating that a violation of an emission limit has taken place. Reports of these incidences shall be submitted semiannually. If no incidences occurred during the reporting period then a letter shall indicate such. Any alternative method for monitoring control device performance must be preapproved by the Department and shall be incorporated into the permit as set forth in S.C. Regulation 61-62.70.7.
D.4	**Equipment/Control Device ID:** BR-1814 (#1 CTO), DR-1814 (#2 CTO), BT-603 (#1 LPA), DT-302 (#2 LPA), CM-301 (#1 CVS), DM-601 (#2 CVS) For any source test required under an applicable standard or permit condition, the owner, operator, or representative shall comply with S.C. Regulation 61-62.1, Section IV - Source Tests. The owner, operator, or representative shall ensure that source tests are conducted while the source is operating at the maximum expected production rate or other production rate or operating parameter which would result in the highest emissions for the pollutants being tested. Some sources may have to spike fuels or raw materials to avoid being subjected to a more restrictive feed or process rate. Any source test performed at a production rate less than the rated capacity may result in permit limits on emission rates, including limits on production if necessary. The owner/operator shall comply with any limits that result from conducting a source test at less than rated capacity. A copy of the most recent Department issued source test summary letter, whether it imposes a limit or not, shall be maintained with the construction permit, for each source that is required to conduct a source test. Site-specific test plans and amendments, notifications, and source test reports shall be submitted to the Manager of the Source Evaluation Section, Bureau of Air Quality.

D. LIMITATIONS, MONITORING AND REPORTING CONDITIONS

<table>
<tr><th>Condition Number</th><th>Conditions</th></tr>
<tr><td>D.5</td><td>Equipment/Control Device ID: BR-1814 (#1 CTO), DR-1814 (#2 CTO)

(S.C. Regulation 61-62.5, Standard No. 3, Section IX) This equipment shall be limited to the maximum allowable emissions of PM of 0.5lb/10^6 Btu and an opacity of 20%, each.

The owner/operator shall perform a visual inspection on a weekly basis. Visual inspection means a qualitative observation of opacity during daylight hours where the inspector records results in a log, noting color, duration, density (heavy or light), cause and correction action taken for any abnormal emissions. The observer does not need to be certified to conduct valid visual inspections. However, at a minimum, the observer should be trained and knowledgeable about the effects on visibility of emissions caused by background contrast, ambient lighting, and observer position relative to lighting, wind, and the presence of uncombined water. Logs shall be kept to record all visual inspections, including cause and corrective action taken for any abnormal emissions and visual inspections from date of recording. The owner/operator shall submit semiannual reports. The report shall include records of abnormal emissions, if any, and corrective actions taken.</td></tr>
<tr><td>D.6</td><td>Equipment/Control Device ID: All

(S.C. Regulation 61-62.5, Standard No. 4, Section VIII) Particulate matter emissions shall be limited to the rate specified by use of the following equations:
For process weight rates less than or equal to 30 tons per hour
$E = (F)\ 4.10P^{0.67}$ and
For process weight rates greater than 30 tons per hour
$E = (F)\ 55.0P^{0.11} – 40$
Where E = the allowable emission rate in pounds per hour
P = process weight rate in tons per hour
F = effect factor from Table B in S.C. Regulation 61-62.5, Standard No. 4

For the purposes of compliance with this condition, the process boundaries are defined as follows:

<table><tr><th>Unit IDs</th><th>Process Weight Rate (ton/hr)</th></tr><tr><td>03-04, combined</td><td>158.93</td></tr><tr><td>05-06, combined</td><td>126.57</td></tr></table>
The owner/operator shall continue to operate and maintain pressure drop gauge(s) on each module of the baghouse. Pressure drop readings shall be recorded daily during source operation. Operation and maintenance checks shall be made on at least a weekly basis for baghouse cleaning systems, dust collection hoppers, and conveying systems for proper operation. The baghouse shall be in place and operational whenever processes controlled by it are running, except during periods of baghouse malfunction or mechanical failure.

Operational ranges for the monitored parameters shall be reviewed and re-established (if appropriate) to ensure proper operation of the pollution control equipment. These operational ranges for the monitored parameters shall be derived from stack test data, vendor certification, and/or operational history and visual inspections, which demonstrate the proper operation of the equipment. If ranges need to be re-established, these ranges and supporting documentation (certification from manufacturer, stack test results, 30 days of normal readings, opacity readings, etc.) shall be submitted to the Director of Engineering Services within 180 days of startup.</td></tr>
</table>

D. LIMITATIONS, MONITORING AND REPORTING CONDITIONS

<table>
<tr><th>Condition Number</th><th>Conditions</th></tr>
<tr><td>D.7</td><td>Equipment/Control Device ID: Unit ID 03 (#1 OX Unit), Unit ID 04 (#1 PTA Unit), Unit ID 05 (#2 OX Unit). Unit ID 06 (#1 PTA Unit)

(S.C. Regulation 61-62.5, Standard No. 4, Section IX) Where construction or modification began after December 31, 1985, emissions from these source(s) (including fugitive emissions) shall not exhibit an opacity greater than 20%, each.

The owner/operator shall perform a visual inspection on a weekly basis. Visual inspection means a qualitative observation of opacity during daylight hours where the inspector records results in a log, noting color, duration, density (heavy or light), cause and correction action taken for any abnormal emissions. The observer does not need to be certified to conduct valid visual inspections. However, at a minimum, the observer should be trained and knowledgeable about the effects on visibility of emissions caused by background contrast, ambient lighting, and observer position relative to lighting, wind, and the presence of uncombined water. Logs shall be kept to record all visual inspections, including cause and corrective action taken for any abnormal emissions and visual inspections from date of recording. The owner/operator shall submit semiannual reports. The report shall include records of abnormal emissions, if any, and corrective actions taken.</td></tr>
<tr><td>D.8</td><td>Equipment/Control Device ID: BR-1814 (#1 CTO), DR-1814 (#2 CTO)

Limits/Standards: In accordance with Standard No. 7 – Prevention of Significant Deterioration and based on BACT analysis, BR-1814 shall be limited to 4.70 lb/hr and DR-1814 shall be limited to 3.50 lb/hr of VOC emissions, each, based on a 3-hour block average. .

In accordance with Standard No. 7 – Prevention of Significant Deterioration and based on BACT analysis, BR-1814 shall be limited to 87.9 lb/hr and DR-1814 shall be limited to 75.0 lb/hr of CO emissions, each, based on a 30-day rolling average.

Testing: An initial source test for VOC and CO emissions, for each CTO, shall be conducted within 180 days after startup, and every three years thereafter. If the catalyst is replaced in a CTO, a new source test schedule shall be required as follows: A source test for VOC and CO emissions shall be conducted within 90 days after changing the catalyst in a CTO, and every three years thereafter. The source test shall be used to show compliance with the Standard No. 7 BACT limits, verify emissions, and verify monitoring parameters. The owner or operator shall operate the source(s) within the parameter(s) established during the most recent satisfactory source tests. A copy of the most recent Department issued source test summary letter(s) that established the parameter(s) shall be maintained with the construction permit.

Monitoring/Record Keeping/Reporting/Other: The owner or operator shall monitor the inlet and outlet temperature of each CTO, while processes venting to the CTO are in operation. These parameters shall be monitored continuously with a daily average, which means that at least one data point shall be measured every 15-minute period, within a 24-hour block period (midnight to midnight), and shall be averaged together for a daily reading. The parameters used to demonstrate compliance shall be the daily average inlet temperature and the daily average delta temperature of the CTO. . Records of hourly block averages of monitored parameters shall be maintained on site for a period of at least 5 years. Records of excursions of monitored parameters shall be submitted semi-annually. If no excursions occurred during the reporting period then a letter shall be submitted to the Department indicating such. An excursion shall be deemed to have occurred if either of the following are met:
▪ The daily average for a parameter is outside the approved monitoring range.
▪ The number of valid 15-minute monitoring periods for a given parameter is less than 75 percent of the number of process operating periods in a 24-hour day.</td></tr>
<tr><td>D.9</td><td>Equipment/Control Device ID: BT-603 (#1 LPA), DT-302 (#2 LPA)

Limits/Standards: In accordance with Standard No. 7 – Prevention of Significant Deterioration and based on BACT analysis, BT-603 shall be limited to 9.60 lb/hr and DT-302 shall be limited to 8.85 lb/hr of VOC emissions, each, based on</td></tr>
</table>

D. LIMITATIONS, MONITORING AND REPORTING CONDITIONS

<table>
<tr><th>Condition Number</th><th>Conditions</th></tr>
<tr><td></td><td>a 3-hour block average.

In accordance with Standard No. 7 – Prevention of Significant Deterioration and based on BACT analysis, BT-603 shall be limited to 4.10 lb/hr and DT-302 shall be limited to 3.50 lb/hr of CO emissions, each, based on a 30-day rolling average.

Testing: An initial source test for VOC and CO emissions, for each LPA, shall be conducted within 180 days after startup, and every three years thereafter. The source test shall be used to show compliance with the Standard No. 7 BACT limits, verify emissions, and verify monitoring parameters. The owner or operator shall operate the source(s) within the parameter(s) established during the most recent satisfactory source tests. A copy of the most recent Department issued source test summary letter(s) that established the parameter(s) shall be maintained with the construction permit.

Monitoring/Record Keeping/Reporting/Other: The owner or operator shall monitor the top liquid flow rate and top temperature of each LPA, while processes venting to the LPA are in operation. These parameters shall be monitored continuously with a daily average, which means that at least one data point shall be measured every 15-minute period, within a 24-hour block period (midnight to midnight), and shall be averaged together for a daily reading. Records of hourly block averages of monitored parameters shall be maintained on site for a period of at least 5 years. Records of excursions of monitored parameters shall be submitted semi-annually. If no excursions occurred during the reporting period then a letter shall be submitted to the Department indicating such. An excursion shall be deemed to have occurred if either of the following are met:
▪ The daily average for a parameter is outside the approved monitoring range.
▪ The number of valid 15-minute monitoring periods for a given parameter is less than 75 percent of the number of process operating periods in a 24-hour day.

The owner or operator shall calculate and maintain hourly CO emissions. Hourly CO emissions shall be calculated on a 30-day rolling average. Reports of the calculated values shall be submitted semiannually.

An algorithm, including example calculations and emission factors, explaining the method used to determine emission rates shall only be included in the initial report. Subsequent submittals of the algorithm are required within 30 days of the change if the algorithm or basis for emissions is modified or the Department requests additional information.</td></tr>
<tr><td>D.10</td><td>Equipment/Control Device ID: CM-301 (#1 CVS), DM-601 (#2 CVS)

Limits/Standards: In accordance with Standard No. 7 – Prevention of Significant Deterioration and based on BACT analysis, CM-301 and DM-601 are limited to 20.0 lb/hr VOC emissions, each, based on a 3-hour block average.

In accordance with Standard No. 7 – Prevention of Significant Deterioration and based on BACT analysis, CM-301 shall be limited to 24.0 lb/hr and DM-601 shall be limited to 20.0 lb/hr of CO emissions, based on a 30-day rolling average.

Testing: An initial source test for VOC and CO emissions, for each CVS, shall be conducted within 180 days after startup, and every three years thereafter. The source test shall be used to show compliance with the Standard No. 7 BACT limits and verify emissions.

Monitoring/Record Keeping/Reporting/Other: The owner or operator shall calculate and maintain hourly VOC and CO emissions. Hourly VOC emissions shall be calculated on a 3-hour block average, and hourly CO emissions shall be calculated on a 30-day rolling average. Reports of the calculated values shall be submitted semiannually.

An algorithm, including example calculations and emission factors, explaining the method used to determine emission rates shall only be included in the initial report. Subsequent submittals of the algorithm are required within 30 days of the change</td></tr>
</table>

D. LIMITATIONS, MONITORING AND REPORTING CONDITIONS

Condition Number	Conditions
	if the algorithm or basis for emissions is modified or the Department requests additional information.
D.11	**Equipment/Control Device ID:** Unit ID 03 (#1 OX Unit), Unit ID 05 (#2 OX Unit) **Limits/Standards:** In accordance with Standard No. 7 – Prevention of Significant Deterioration and based on BACT analysis, all fugitive VOC emissions from the #1 and #2 Oxidation Units shall be required to comply with the HON LDAR program (40 CFR 63 Subpart H). **Testing:** Testing shall be performed as per 40 CFR 63.180. **Monitoring/Record Keeping/Reporting/Other:** Monitoring, recordkeeping, and reporting shall be performed in accordance with 40 CFR 63.160 through 60.182. All VOCs from these processes shall be treated as Hazardous Air Pollutants (HAPs) for determining compliance.
D.12	**Equipment/Control Device ID:** DB-1813 (#2 OX HPVGTS Fired Heater) **Limits/Standards:** In accordance with Standard No. 7 – Prevention of Significant Deterioration and based on BACT analysis, the #2 OX HPVGTS Fired Heater shall be limited to 0.0055 lb/MM BTU for VOCs and 0.084 lb/MM BTU for CO, each based on a 3-hour block average. **Testing:** None required. **Monitoring/Record Keeping/Reporting/Other:** This source is permitted to burn only natural gas as fuel. The use of any other substances as fuel is prohibited without prior written approval from the Department. Natural gas fuel usage shall be monitored and recorded on a monthly basis. Records of natural gas usage shall be submitted semiannually. The owner or operator shall develop a tune-up plan and perform tune-ups on this source, once every 13 months from the date of startup. The tune-up plan shall be developed in accordance with manufacturer's specifications or with good engineering practices. Records of tune-ups shall be submitted semiannually. The tune-up plan shall only be included in the initial report. Subsequent submittals of the tune-up plan are required within 30 days of the change if the plan is modified or the Department requests additional information. The owner or operator shall implement good combustion practice(s) on this source. Good combustion practice is defined as maintaining proper air/fuel mixture in the combustion zone by holding excess oxygen between 3.5 and 12%. Percent excess oxygen shall be monitored continuously with a daily average, which means that at least one data point shall be measured every 15-minute period, within a 24-hour block period (midnight to midnight), and shall be averaged together for a daily reading. Records of hourly block averages of monitored parameters shall be maintained on site for a period of at least 5 years. Records of excursions of monitored parameters shall be submitted semi-annually. If no excursions occurred during the reporting period then a letter shall be submitted to the Department indicating such. An excursion shall be deemed to have occurred if either of the following are met: ▪ The daily average for a parameter is outside the approved monitoring range. ▪ The number of valid 15-minute monitoring periods for a given parameter is less than 75 percent of the number of process operating periods in a 24-hour day.

D. LIMITATIONS, MONITORING AND REPORTING CONDITIONS

Condition Number	Conditions
D.13	**Equipment/Control Device ID:** BM-1201, BM-1204 **Limits/Standards:** In accordance with Standard No. 7 – Prevention of Significant Deterioration and based on BACT analysis, these sources shall meet Tier 3 emission standards of 40 CFR 60 Subpart IIII, shall be limited to operating no more than 100 hours per year on a non-emergency basis, and shall burn only ultra low sulfur diesel as fuel. **Testing:** None required. **Monitoring/Record Keeping/Reporting/Other:** The owner or operator shall record the actual operating hours of each generator on a monthly basis. Reports of the recorded hours of operation shall be submitted semiannually. These sources are permitted to burn only ultra low diesel as fuel. The use of any other substances as fuel is prohibited without prior written approval from the Department. Fuel oil sulfur content shall be less than or equal to 0.0015 percent by weight. Fuel oil supplier certification shall be obtained for each batch of oil received and stored on site. Reports of the recorded sulfur content shall be submitted semiannually.
D.14	**Equipment/Control Device ID:** Unit ID 03 (#1 OX Unit), Unit ID 05 (#2 OX Unit) (40 CFR 60, Subparts A and VVa) These units are subject to the requirements of 40 CFR 60, Subpart VVa. However, since these units are subject to the HON LDAR program under 40 CFR 63 Subpart H, they are required to comply only with the provisions of 40 CFR 63 Subpart H, per §63.160(b)(1).
D.15	**Equipment/Control Device ID:** BR-301 (#1 OX Reactor), DR-106 A/B (#2 OX Reactors) (40 CFR 60, Subparts A and III) These sources are subject to the requirements of 40 CFR 60, Subpart III. However, since these sources are or will be Group 2 HON process vents, they are required to comply only with the provisions of 40 CFR 63 Subpart G, per §63.110(d)(2)(ii).
D.16	**Equipment/Control Device ID:** BT-701 (#1 DHT), DT-403 (#2 DHT), BT-750 (#1 ERT), DT-450 (#2 ERT) (40 CFR 60, Subparts A and NNN) These sources are subject to the requirements of 40 CFR 60, Subpart NNN. However, since these sources will be Group 2 HON process vents, they are required to comply only with the provisions of 40 CFR 63 Subpart G, per §63.110(d)(5)(ii).
D.17	Prior to start up of equipment as allowed under this PSD construction permit, the facility shall continue to comply with the current established synthetic minor limitations as listed in the project description section. The facility shall notify the Department 15 days after completion of a project that would result in a synthetic minor limit no longer being applicable.

E. RESERVED

F. MODELING REQUIREMENTS

Condition Number	Condition
F.1	Air dispersion modeling (or other method) has demonstrated that this facility's operation will not interfere with the attainment and maintenance of any state or federal ambient air standard. Any changes in the parameters used in the air dispersion modeling may require a review by the facility to determine continuing compliance with these standards. These potential changes include any decrease in stack height, decrease in stack velocity, increase in stack diameter, decrease in stack exit temperature, increase in building height or building additions, increase in emission rates, decrease in distance between stack and property line, changes in vertical stack orientation, and installation of a rain cap that impedes vertical flow. Parameters that are not required in the determination will not invalidate the demonstration if they are modified. The emission rates used in the determination are listed in Attachment - Modeled Emission Rates of this permit. Higher emission rates may be administratively incorporated into Attachment - Modeled Emission Rates of this permit provided a demonstration using these higher emission rates shows the attainment and maintenance of any state or federal ambient air quality standard or with any other applicable requirement. Variations from the input parameters in the demonstration shall not constitute a violation unless the maximum allowable ambient concentrations identified in the standard are exceeded. The owner/operator shall maintain this facility at or below the emission rates as listed in Attachment - Modeled Emission Rates, not to exceed the pollutant limitations of this construction permit. Should the facility wish to increase the emission rates listed in Attachment - Modeled Emission Rates, not to exceed the pollutant limitations in the body of this permit, it may do so by the administrative process specified above. This is a State Only enforceable requirement.

G. NESHAP PERIODIC REPORTING SCHEDULE SUMMARY

NESHAP Part	NESHAP Subpart	Compliance Monitoring Report Submittal Frequency	Reporting Period	Report Due Date
63	F & G	Semi-Annual (Periodic Report)	January 1 – June 30 July 1 – December 31	No later than 60 calendar days after the end of each 6-month period
63	H	Semi-Annual	January 1 – June 30 July 1 – December 31	No later than 60 days after the end of each reporting per
63	ZZZZ (Emergency Generators)	N/A	N/A	N/A

1. This table summarizes only the periodic compliance reporting schedule. Additional reports may be required. See specific NESHAP Subpart for additional reporting requirements and associated schedule.
2. This reporting schedule does not supersede any other reporting requirements including but not limited to 40 CFR Part 60, 40 CFR Part 61, 40 CFR Part 63, and/or Title V. The MACT reporting schedule may be adjusted to coincide with the Title V reporting schedule with prior approval from the Department in accordance with §63.10.a.5. This request may be made 1 year after the compliance date for the associated MACT standard.

H. NESHAP - CONDITIONS

Condition Number	Condition
H.1	All NESHAP notifications and reports shall be sent to the Manager of the Air Toxics Section, South Carolina Department of Health and Environmental Control - Bureau of Air Quality.

H. NESHAP - CONDITIONS

Condition Number	Condition
H.2	All NESHAP notifications and the cover letter to periodic reports shall be sent to the United States Environmental Protection Agency (US EPA) at the following address: **US EPA, Region 4** **Air, Pesticides and Toxics Management Division** **61 Forsyth Street** **Atlanta, GA 30303**
H.3	This facility has processes subject to the provisions of S.C. Regulation 61-62.63 and 40 CFR Part 63, National Emission Standards for Hazardous Air Pollutants, Subparts A and F, National Emission Standards For Organic Hazardous Air Pollutants From The Synthetic Organic Chemical Manufacturing Industry. Existing affected sources shall be in compliance with the requirements of these Subparts on the compliance date, unless otherwise noted. Any new affected sources shall comply with the requirements of these Subparts upon initial start-up unless otherwise noted.
H.4	This facility has processes subject to the provisions of S.C. Regulation 61-62.63 and 40 CFR Part 63, National Emission Standards for Hazardous Air Pollutants, Subparts A and G, National Emission Standards For Organic Hazardous Air Pollutants From The Synthetic Organic Chemical Manufacturing Industry For Process Vents, Storage Vessels, Transfer Operations, And Wastewater. Existing affected sources shall be in compliance with the requirements of these Subparts on the compliance date, unless otherwise noted. Any new affected sources shall comply with the requirements of these Subparts upon initial start-up unless otherwise noted.
H.5	This facility has processes subject to the provisions of S.C. Regulation 61-62.63 and 40 CFR Part 63, National Emission Standards for Hazardous Air Pollutants, Subparts A and H, National Emission Standards For Organic Hazardous Air Pollutants For Equipment Leaks. Existing affected sources shall be in compliance with the requirements of these Subparts on the compliance date, unless otherwise noted. Any new affected sources shall comply with the requirements of these Subparts upon initial start-up unless otherwise noted.
H.6	This facility has processes subject to the provisions of S.C. Regulation 61-62.63 and 40 CFR Part 63, National Emission Standards for Hazardous Air Pollutants, Subparts A and ZZZZ, National Emission Standards For Organic Hazardous Air Pollutants For Stationary Reciprocating Internal Combustion Engines (RICE). Existing affected sources shall be in compliance with the requirements of these Subparts on the compliance date, unless otherwise noted. Any new affected sources shall comply with the requirements of these Subparts upon initial start-up unless otherwise noted.

I. PERIODIC REPORTING SCHEDULE

Compliance Monitoring Report Submittal Frequency	Reporting Period (Begins on the startup date of the source.)	Report Due Date
Quarterly	January-March April-June July-September October-December	April 30 July 30 October 30 January 30
Semiannual	January-June April-September July-December October-March	July 30 October 30 January 30 April 30
Annual	January-December April-March July-June October-September	January 30 April 30 July 30 October 30
Note: This reporting schedule does not supersede any federal reporting requirements including but not limited to 40 CFR Part 60, 40 CFR Part 61, and 40 CFR Part 63. All federal reports must meet the reporting time frames specified in the federal standard unless the Department or EPA approves a change.		

J. REPORTING CONDITIONS

Condition Number	Condition
J.1	Reporting required in this permit, shall be submitted in a timely manner as directed in the Periodic Reporting Schedule of this permit.
J.2	All reports and notifications required under this permit shall be submitted to the person indicated in the specific condition at the following address: **2600 Bull Street** **Columbia, SC 29201** The contact information for the local EQC Regional office can be found at: **http://www.scdhec.gov**
J.3	The owner/operator shall submit written notification to the Director of Engineering Services of the date construction is commenced, postmarked no later than 30 days after such date.
J.4	Unless elsewhere specified within this permit, all reports required under this permit shall be submitted to the Manager of the Technical Management Section, Bureau of Air Quality.
J.5	(S.C. Regulation 61-62.1, Section II.J) For sources not required to have continuous emissions monitors, any malfunction of air pollution control equipment or system, process upset or other equipment failure which results in discharges of air contaminants lasting for one hour or more and which are greater than those discharges described for normal operation in the permit application shall be reported to the Department's local Environmental Quality Control Regional office within 24 hours after the beginning of the occurrence. The owner/operator shall also submit a written report within 30 days of the occurrence. This report shall be submitted to the Manager of the Technical Management Section, Bureau of Air Quality and shall include, at a minimum, the following: 1. The identity of the stack and/or emission point where the excess emissions occurred; 2. The magnitude of excess emissions expressed in the units of the applicable emission limitation and the operating data and calculations used in determining the excess emissions; 3. The time and duration of excess emissions; 4. The identity of the equipment causing the excess emissions; 5. The nature and cause of such excess emissions; 6. The steps taken to remedy the malfunction and the steps taken or planned to prevent the recurrence of such malfunction; 7. The steps taken to limit the excess emissions; and, 8. Documentation that the air pollution control equipment, process equipment, or processes were at all times maintained and operated, to the maximum extent practicable, in a manner consistent with good practice for minimizing emissions.

K. PERMIT EXPIRATION AND EXTENSION

Condition Number	Condition
K.1	(S.C. Regulation 61-62.1, Section II.A.4) Approval to construct shall become invalid if construction: a. is not commenced within 18 months after receipt of such approval; b. is discontinued for a period of 18 months or more; or c. is not completed within a reasonable time as deemed by the Department. The Department may extend the construction permit for an additional 18-month period upon a satisfactory showing that an extension is justified. This request must be made prior to the permit expiration.
K.2.	This provision does not apply to the time period between construction of the approved phases of a phased construction project; each phase must commence construction within 18 months of the projected and approved commencement date.

L. PERMIT TO OPERATE

Condition Number	Condition
L.1	(S.C. Regulation 61-62.1 Section II.F.2) The owner/operator or professional engineer in charge of the project shall certify that, to the best of his/her knowledge and belief and as a result of periodic observation during construction, the construction under application has been completed in accordance with the specifications agreed upon in the construction permit issued by the Department.
L.2	If construction is certified as provided in S.C. Regulation 61-62.1 Section II.F.2, the owner or operator, may operate the source in compliance with the terms and conditions of the construction permit until the operating permit is issued by the Department.
L.3	If construction is not built as specified in the permit application and associated construction permit(s), the owner/operator must submit to the Department a complete description of modifications that are at variance with the documentation of the construction permitting determination prior to commencing operation. Construction variances that would trigger additional requirements that have not been addressed prior to start of operation shall be considered construction without a permit.
L.4	(S.C. Regulations 61-62.1 Section II.F.3 and 61-62.70.7) The owner or operator shall submit a written request to the Director of the Engineering Services for a new or revised operating permit to cover any new or altered source postmarked no later than 15 days after the actual date of initial startup unless a more stringent time frame is required by regulation. The request should be made using the appropriate Title V modification form.

M. RESERVED

N. GENERAL CONDITIONS

Condition Number	Condition
N.1	The permittee shall pay permit fees to the Department in accordance with the requirements of S.C. Regulation 61-30, Environmental Protection Fees.
N.2	In the event of an emergency, as defined in S.C. Regulation 61-62.1, Section II.L, the owner or operator shall demonstrate the affirmative defense of an emergency through properly signed, contemporaneous operating logs, and other relevant evidence that verify: 1. An emergency occurred, and the owner or operator can identify the cause(s) of the emergency; 2. The permitted source was at the time the emergency occurred being properly operated; 3. During the period of the emergency, the owner or operator took all reasonable steps to minimize levels of emissions that exceeded the emission standards, or other requirements in the permit; and 4. The owner or operator gave a verbal notification of the emergency to the Department within 24 hours of the time when emission limitations were exceeded, followed by a written report within 30 days. The written report shall include, at a minimum, the information required by S.C. Regulation 61-62.1, Section II.J.1.c.i through viii. The written report shall contain a description of the emergency, any steps taken to mitigate emissions, and corrective actions taken. In any enforcement action, the owner or operator seeking to establish the occurrence of an emergency has the burden of proof. This provision is in addition to any emergency, or upset provision contained in any applicable requirement.

N. GENERAL CONDITIONS

Condition Number	Condition
N.3	(S.C. Regulation 61-62.1, Section II.O) Upon presentation of credentials and other documents as may be required by law, the owner or operator shall allow the Department or an authorized representative to perform the following: 1. Enter the facility where emissions-related activity is conducted, or where records must be kept under the conditions of the permit. 2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. 3. Inspect any facilities, equipment (including monitoring and air pollution control equipment), practices, or operations regulated or required under this permit. 4. As authorized by the Federal Clean Air Act and/or the S.C. Pollution Control Act, sample or monitor at reasonable times substances or parameters for the purpose of assuring compliance with the permit or applicable requirements.

ATTACHMENT - MODELED EMISSION RATES

BP Amoco Chemical Company-Cooper River Plant
0420-0029-CU
PAGE 1 OF 2

The emission rates listed herein are not considered enforceable limitations but are used to evaluate ambient air quality impact. Until the Department makes a determination that a facility is causing or contributing to an exceedance of a state or federal ambient air quality standard, increases to these emission rates are not in themselves considered violations of these ambient air quality standards (see Modeling Requirements).

AMBIENT AIR QUALITY STANDARDS - STANDARD NO. 2					
Emission Point ID	Modeled Emission Rates (lbs/hr)				
	PM_{10}	$PM_{2.5}$	SO_2	NO_X	CO
#1ATMOS	--	--	--	--	3.03
#1HPVGTS	--	--	--	--	87.70
#1LPVGT (1)	--	--	--	--	--
#1OXGEN2	0.738	--	0.690	10.405	--
#2ATMOS	--	--	--	--	3.47
#2BULKLO	0.500	--	--	--	--
#2CRYSVE	0.540	--	--	--	20.00
#2DAYSIL	0.540	--	--	--	--
#2DRYEVE	0.260	--	--	--	--
#2FDDRUM	0.040	--	--	--	--
#2HPVGTS	0.111	--	0.008	1.468	1.238
#2NEWPTA	0.480	--	--	--	--
#2OXGEN3	0.754	--	0.429	25.770	--
#2PVS	--	--	--	--	75.00
#2SHIP	0.300	--	--	--	--
BOILER#3 – Low Load	2.540	--	47.62	8.492	--
BOILER#4 – Low Load	2.540	--	47.62	8.492	--
CVSCRUBR	1.21	--	--	--	24.00
DAYSILO1	0.42	--	--	--	--
DAYSILO2	0.42	--	--	--	--
DVSCRUBR	0.60	--	--	--	--
FEEDSLUR	0.10	--	--	--	--
ITEGEN	0.680	--	1.603	14.580	--
LCOMP1	1.800	--	3.000	3.500	--
LCOMP2	1.800	--	3.000	3.500	--
PTASTORA	1.68	--	--	--	--
RAWH2O	0.627	--	0.587	8.841	--
SCREENR3	0.10	--	--	--	--
SCREENR4	0.10	--	--	--	--
TASILOS	1.50	--	--	--	--
UTCOMP#1	0.91	--	0.85	12.80	--
UTCOMP#2	0.349	--	2.333	28.556	--
UTGEN#1	0.811	--	0.754	11.445	--

ATTACHMENT - MODELED EMISSION RATES

BP Amoco Chemical Company-Cooper River Plant
0420-0029-CU

CLASS II PREVENTION OF SIGNIFICANT DETERIORATION - STANDARD NO. 7				
Emission Point ID	**Modeled Emission Rates (lbs/hr)**			
	$PM_{2.5}$	**PM_{10}**	**SO_2**	**NO_X**
#2BULKLO	0.500	--	--	--
#2CRYSVE	0.540	--	--	--
#2DAYSIL	0.540	--	--	--
#2DRYEVE	0.260	--	--	--
#2FDDRUM	0.040	--	--	--
#2HPVGTS	0.111	--	0.008	1.468
#2NEWPTA	0.480	--	--	--
#2OXGEN3	0.754	--	0.429	1.471
#2SHIP	0.300	--	--	--
BOILER#1	-25.588	--	-555.533	-74.890
BOILER#2	-25.588	--	-555.533	-74.890
BOILER#3	2.540	--	47.620	8.492
BOILER#4	2.540	--	47.620	8.492
ITEGEN	0.680	--	1.603	0.833
LCOMP1	1.800	--	3.000	3.500
LCOMP2	1.800	--	3.000	3.500
SCREENR3	0.01	--	--	--
SCREENR4	0.01	--	--	--
UTCOMP#2	0.349	--	2.333	28.556

Appendix E

Statement of Basis

Company Name:	BP Amoco Chemical Company – Cooper River Plant	**Permit Writer:**	James C. Robinson
Permit Number:	0420-0029-CU	**Date:**	DRAFT

EXPEDITED REVIEW

DATE APPLICATION RECEIVED: Initial - April 11, 2013, Revisions – March 11, 2014, August 12, 2014

DATE OF OCRM APPROVAL: April 26, 2013

FACILITY DESCRIPTION BP Amoco Chemical Company – Cooper River Plant (BPCR) produces only Purified Terephthalic Acid (PTA). PTA is used to make polyester fibers and films. The major raw materials in the production of PTA are Paraxylene (Px), acetic acid, caustic soda, and hydrogen. Plant operation consists mainly of: 1) utilities 2) production of crude TA, 3) purification into PTA, 4) product loading/ shipping, and 5) waste treatment along with some additional areas at the plant. There are two units that manufacture PTA: Cooper River #1 (CR#1), which consists of the #1 Oxidation (OX) Unit and the #1 PTA Unit; and Cooper River #2 (CR#2), which consists of the #2 Oxidation (OX) Unit and the #2 PTA Unit. The #1 and #2 OX Units produce crude TA and the #1 and #2 PTA Units purifies the crude TA, to make PTA.

PROJECT DESCRIPTION BPCR is proposing to modify the #1 and #2 Oxidation (OX) Units to remove limitations that prevent the units from operating at their unit design capacities (debottlenecking); and to make minor modifications to the #1 and #2 PTA Units to reduce operating costs. In general, these modifications will include improvements to the reaction environment, additional reaction air capacity, optimization of the recovery systems, improved Dehydration Tower (DHT) operation, improved energy recovery, removal of several emission points, addition of dense phase conveying and additional cooling tower capacity. These changes will result in increased actual hourly production and emissions rates, but will not increase maximum production rates nor potential emission rates. This project is referred to as the OX Modernization/Debottleneck project. See Preliminary Determination for more detailed project description.

<u>LPA Recovery Device vs. Control Device Determination</u>
In the most recent Title V permit (issued in 2007), the Low Pressure Absorbers (LPAs) are listed as control devices. BPCR states that the main purpose of the LPAs have always been to recover acetic acid, a valuable raw material. The initial Title V (issued in 2001) described the LPAs as recovery devices, and the recovery device description was inadvertently dropped when the Title V permit was renewed in 2007.

Historically the LPAs have not been HON process vents because they have not been receiving input streams from an oxidation reactor, distillation unit or reactor. However, after the modifications included in this PSD permit application, each LPA will receive the overhead stream from a distillation unit (Dehydration Tower) and will meet the definition of a HON recovery device. Each LPA will be the last recovery device in the process, and will be a HON Group 2 process vent.

Because the LPAs have been 1) historically used to recover valuable raw materials and 2) will meet the definition of a HON recovery device, the BAQ consider the LPAs as recovery devices, and not control devices. If the function of the LPAs changes or additional information arises in regards to the purpose or operation of the LPAs, a new determination will be made as to whether the LPAs are control devices or recovery devices.

SOURCE TEST REQUIREMENTS In order to monitor and determine if BACT emission limits are being met, the facility will have to perform initial source tests 180 days after start-up of these modifications, and once every three years thereafter on the following emission points: The #1 and #2 OX LPA and HPVGTS (Catalytic Oxidizer) Units (CTO), and the #1 and #2 PTA Crystallizer Vent Scrubbers. If there is a change of the catalyst in a CTO, a new source test schedule will be as follows: A source test is required within 90 days after changing the catalyst in a CTO, and every three years thereafter

SPECIAL CONDITIONS, MONITORING, LIMITS All VOC BACT limits are based on a 3-hour block average, and all CO BACT limits are based on a 30-day rolling average, except for the #2 OX HPVGTS Fired Heater. The Fired Heater will have a CO BACT limit based on a 3-hour block average.

BACT Monitoring, Recordkeeping and Reporting for CTOs, LPAs, and Fired Heater
Continuous monitoring, as defined by 63.152(f), means that at least one data point shall be measured every 15-minute period, within a 24-hour block period, and shall be averaged together for a daily reading. A 24-hour block period, as defined by BPCR, is midnight to midnight.

Records of the hourly block averages of monitored parameters shall be maintained on site for at least 5 years.

Records of excursions of monitored parameters shall be submitted semi-annually. An excursion, as defined by 63.152(c)(2)(ii)(A), occurs when 1) the daily average for a parameter is outside the approved monitoring range, or 2) the number of valid 15-minute monitoring periods for a given parameter is less than 75 percent of the number of process operating periods in a day.

Although BACT parametric monitoring, recordkeeping, and reporting for these sources have been derived from, and referenced to in this SOB, HON regulations, the permit conditions for these sources will not have references to the HON rule.

EMISSIONS The emission calculations submitted as part of this PSD permit have been verified for accuracy.

FACILITY WIDE EMISSIONS*		
Pollutant	**Uncontrolled Emissions**	**Controlled/Limited Emissions**
	TPY	**TPY**
PM	5,394.2	77.1
PM_{10}	5,356.2	73.0
$PM_{2.5}$	5,261.6	67.9
SO_2	190.9	189.0
NOx	495.7	324.9
CO	14,820.5	1233.0
VOC	2,587.2	576.5
Lead	1.0	1.0
GHG Mass	482,000	479,586
GHG CO_2e	484,519	480,031
Highest HAP (Paraxylene)	227.9	58.5
Total HAP	1688.1	128.6

* Facility Wide Emissions are based on post project modifications, and with BACT limits applied.

OPERATING PERMIT STATUS
BPCR is a Title V Source for PM_{10}, NOx, CO, SO_2, VOC, CO_2e, and single and combined HAPs. BPCR is a “28 Source Category” PSD major source (PTE >100 TPY) for PM, PM_{10}, NOx, CO, SO_2, VOC, and CO_2e. BPCR currently operates under an existing TV operating permit. A timely TV renewal application was submitted on February 24, 2012.

REGULATORY APPLICABILITY REVIEW

Regulation	Comments/Periodic Monitoring Requirements
Section II.E - Synthetic Minor	This project is removing several VOC and CO synthetic minor (SM) PSD avoidance limits for units affected by this project, and including the VOC and CO emissions from these units in the BACT Analysis. No other SM limits are being changed, and facility will continue to comply with those SM limits. See table below for the SM limits that are being removed.
Standard No. 1	No fuel burning sources are being modified with this project. Project will require incremental steam usage from the two existing boilers.
Standard No. 3 (state only)	The catalytic oxidizers in HPVTS #1 and #2 will continue to be subject to all applicable requirements of this standard, which includes maximum allowable emissions of PM of 0.5 lb/10^6 Btu and a 20% opacity limit. The Department has granted an exemption for the PM testing requirements under Section VIII, because the oxidizers do not treat waste that contains PM emissions. An exemption from all of the Operator Training Requirements in Section IX.C has been granted for the oxidizers , due to them only treating gaseous emissions. BPCR has stated in this PSD and its TV Renewal applications that the two catalytic oxidizers are not subject to this standard. BPCR stated that the oxidizers are not combustion systems intended to be covered by this regulation, because the sources covered under this regulation use an open flame to burn waste, whereas BPCR’s catalytic

Regulation	Comments/Periodic Monitoring Requirements
	oxidizers use a catalyst to chemically convert the waste.. After further review of the applicability of this standard to the catalytic oxidizers, the BAQ has determined that the two oxidizers are still considered to be Industrial Incinerators as defined by this standard., and therefore continues to be subject to this standard.
Standard No. 4	The #1 OX & PTA units (Unit IDs 03 & 04) and #2 OX & PTA units (Unit IDs 05 & ID 06) have opacity limits (including any fugitives) and PM allowable emissions rates (based on a process weight rate in tons per hour) under this standard. See Standard 4 table below.
Standard No. 5	This project does not contain any sources regulated under this standard.
Standard No. 5.1 (state only)	The facility does not have actual emissions of 100 TPY of VOCs above the baseline. Facility has a decrease in actual emissions from the baseline. (Baseline=2831 TPY, potential uncontrolled after project = 2587.2 TPY)
Standard No. 5.2	No fuel burning sources are being modified with this project.
Standard No. 7	The proposed project includes modified emission units that are subject to PSD review and will have VOC and CO emissions increases requiring a BACT analysis. See Std 7 Table Below for proposed BACT limits.
61-62.6	Fugitive PM (Dust) emissions are not expected from this facility.
40 CFR 60 and 61-62.60	Subpart A: This subpart provides general requirements for applicable sources subject to an NSPS. This project will not change any requirements of this subpart. Subpart Kb: Facility proposes to install a new fixed roof n-Butyl Alcohol (NBA) storage tank in each OX unit. The exact size of these two tanks has not been determined yet, but they will be over 151 m^3 (39,889.97 gal). Because NBA has maximum true vapor pressures less than 3.5 kPa, the two tanks will be not be subject to this subpart. Subpart VV: CR #1 is currently not subject because it was built before January 5, 1981. In 2007, the facility agreed to implement a VOC LDAR program equivalent to this subpart, in order to avoid a PSD review. CR#2 is currently subject to this regulation. Subpart VVa: CR#1 & #2 will be subject because they will be modified as defined by this regulation. The facility will use the LDAR program under 40 CFR 63 Subpart H to comply with this regulation. Supart III: The proposed #1 OX Reactor will be subject to this subpart. The #2 OX Reactor is currently subject to this subpart, and will continue to be subject. The total resource evaluation for both reactors is above four after the last recovery device, and therefore the reactors will have no requirements other than to keep track of potential changes of the TRE per 40 CFR 60.610(c). Subpart NNN: Modifications to the #1 OX DHT will make it subject to this regulation. The #2 OX DHT is currently subject to this subpart, and will continue to be subject. A new distillation tower (Entrainer Recovery Tower) will be added to the #1 and #2 OX Units, and both towers will be subject to this standard. Each new tower will vent to the same recovery system as each DHT tower. The TRE after the last recovery device in each OX unit's distillation tower vent system will be above eight, so the only requirement to meet this regulation is to keep track of potential changes in the TRE. Subpart RRR: The #1 and #2 OX Unit reactors (existing and proposed) meet the exclusion requirement of this subpart because they are air oxidation reactors, and are subject to 40 CFR Subpart III. The #1 and #2 PTA Unit "reactors" are not subject to this subpart because they only purify the TA produced in the OX Unit reactors. Subpart IIII: Exising engines are not subject because they were purchased before the applicability date. The two new engines (Emergency Generators BM-1201 replacement engine and new BM-1204) being added will be subject to this subpart. These generators will be subject to the Tier 3 requirements, and will be required to have a non-resettable hour meter and to use ultra low sulfur (15 ppm) diesel fuel.
40 CFR 61 and 61-62.61	Subpart FF: This facility is a chemical manufacturing plant that historically has < 1 megagrams of total annual benzene quantity from facility waste. An owner or operator of a facility at which the total annual benzene quantity from facility waste is less than 10 megagrams per year (Mg/yr) (11 ton/yr) shall be exempt from the requirements of

Regulation	Comments/Periodic Monitoring Requirements
	paragraphs (b) and (c) of 40 CFR 61.342. This project will not change applicable requirements for this regulation.
40 CFR 63 and 61-62.63	Subpart A: This subpart provides general requirements for applicable sources subject to a MACT. This project will not change any requirements of this subpart. Subpart F: This subpart provides general requirements for HAP emissions from SOCMI sources. This project will not change any requirements of this subpart. Subpart G: Both OX and PTA units are subject to this subpart. All existing affected sources will remain, or will become, Group 2. The modifications in this project do not constitute reconstruction, because the total cost of the modifications are less than 50% of the replacement cost. Therefore, the CR #1 will remain an existing HON source, and CR #2 will remain a new HON source. This project will create new Group 2 process vents, and will also add new Group 2 storage tanks. Note: BPCR is required to monitor Group 1 equipment per Group 1 requirements, until a updated NOCS is submitted designating all Group 1 equipment has been changed to Group 2 status. Subpart H: Both OX and PTA units are subject to this subpart. However, since the PTA unit has no streams that contain over 5% HAPS or VOC there will be no components to monitor in this unit. BACT will require all VOC fugitives to be monitored as HAPs by this LDAR program. Subpart EEEE: Some sources (i.e., storage tanks and pipelines) are potentially subject to this regulation, but they are subject to the HON regulations. Hence, there are no requirements under this regulation. Subpart ZZZZ: The two proposed new emergency generators are subject to this subpart. Subpart DDDDD: The #2 OX HPVGTS Fired Heater is an existing source under this subpart.
61-62.68	Facility does not maintain any regulated substance above the applicable threshold values.
40 CFR 64	Facility is subject to this rule and will be required to maintain compliance with this rule during and after the project is completed

MODELING REVIEW

Regulation	Comments/Periodic Monitoring Requirements
Standard No. 2	Facility has demonstrated compliance through modeling for AAQS; see modeling summary dated 9/30/2014. No operational restriction has been established to ensure compliance with the modeled emission rates.
Standard No. 7.c	This facility has demonstrated compliance through modeling for the PSD Class II increments for Berkeley County; see modeling summary dated 9/30/2014.
Standard No. 8 (state only)	No modeling was required for this standard.

Synthetic Minor Standard No. 7 (PSD) Avoidance Limits To Be Removed					
OP ID	**CP ID(s)**	**Process/Equipment**	**Pollutant**	**Emission Limitation (lb/hr)**	**Emission Limitation (TPY)**
03	CP & CR	#1 OX LPA (BT-603)	VOC	40	80
03	CR	#1 OX LPA (BT-603)	CO	N/A	40
03	CP & CR	#1 DHT Scrubber (BT-702)	VOC	60	165
03	CR	#1 DHT Scrubber (BT-702)	CO	N/A	380
03	CJ & CR	#1 OX HPVGTS	VOC	85	80
03	CJ & CR	#1 OX HPVGTS	CO	1452	375

Synthetic Minor Standard No. 7 (PSD) Avoidance Limits To Be Removed					
OP ID	**CP ID(s)**	**Process/Equipment**	**Pollutant**	**Emission Limitation (lb/hr)**	**Emission Limitation (TPY)**
05	CF*	#2 OX Unit (LPA, HPVGTS)	VOC	15.57	N/A
05	CF*	#2 PTA Unit (Crystallizer Vent Scrubber)	VOC	25.6	N/A
05	CF*	#2 OX Fugitives	VOC	3.5	N/A
05	CF*	#2 OX HPVGTS Heater	VOC	0.84	N/A
03-06	CP	CR#1 & CR#2	VOC	N/A	1825

* Construction Permit 0420-0029-CF established a total PSD avoidance limit of 49.26 lb VOC/hr for the Cooper River #2 Plant. This limit consisted of these four sources of emissions, and the following sources of emissions: Incremental increase from the Tank Farm (0.02 lb/hr) and Wastewater Fugitives (3.11 lb/hr), the Anaerobic Reactor (0.31 lb/hr), and the CO_2 Stripper (0.35 lb/hr). A revised PSD avoidance SM limit established through construction permit 0420-0029 will be the sum of the emissions from the Tank Farm, Wastewater Fugitives, Anaerobic Reactor, and CO_2 Stripper (3.79 lb/hr).

Standard No. 4 Opacity Limits and PM Allowable Rates					
OP ID	**Opacity (%)**	**PM Allowable (lb/hr)**	**Process Weight Rate (tons/hr)**	**Uncontrolled PM Emissions (lb/hr)**	**Controlled PM Emissions (lb/hr)**
03-04, combined	20	56.0	158.93	352.6	4.27
05-06, combined	20	53.67	126.57	603.7	1.48

Standard No. 7 Proposed BACT Limits			
Process/Equipment	**Pollutant**	**BACT Limit**	**Control Method**
#1 OX High Pressure Absorber	VOC	4.70 lb/hr	CTO
	CO	87.9 lb/hr	CTO
#1 OX Low Pressure Absorber	VOC	9.60 lb/hr	N/A
	CO	4.10 lb/hr	N/A
#1 OX Fugitives	VOC	HON LDAR	HON LDAR
#1 PTA Crystallizer Vents	VOC	20.0 lb/hr	N/A
	CO	24.0 lb/hr	N/A
#2 OX High Pressure Absorber	VOC	3.50 lb/hr	CTO
	CO	75.0 lb/hr	CTO
#2 OX Low Pressure Absorber	VOC	8.85 lb/hr	N/A
	CO	3.50 lb/hr	N/A
#2 OX Fugitives	VOC	HON LDAR	HON LDAR
#2 PTA Crystallizer Vents	VOC	20.0 lb/hr	N/A
	CO	20.0 lb/hr	N/A
#2 OX HPVGTS Fired Heater	VOC	0.0055 lbs/MM BTU	Good Combustion Practices, Natural Gas as sole fuel, Tune-ups
	CO	0.084 lbs/MM BTU	
#1 OX New Emergency Generators	VOC	100 hours per year non-emergency use, Tier 3 emission standards, and use of only ultra low sulfur (15 ppm) diesel fuel	N/A
	CO		

PUBLIC NOTICE
This construction permit will undergo a 30-day public notice period to establish PSD limit in accordance with SC Regulation 61-62.1, Section II(N). This permit was placed in *The Post and Courier* newspaper on October 8, 2014. The comment period was open from October 8, 2014 to November 6, 2014 and was placed on the BAQ website during that time period.

ADDITIONAL PUBLIC PARTICIPATION N/A

SUMMARY AND CONCLUSIONS

It has been determined that this source, if operated in accordance with the submitted application, will meet all applicable requirements and emission standards.

Appendix F

Public Notice of Draft PSD Construction Permit

PUBLIC NOTICE OF A DRAFT AIR PERMIT

State of South Carolina (SC)
Department of Health and Environmental Control (DHEC)
Bureau of Air Quality (BAQ)
2600 Bull Street
Columbia, South Carolina 29201
(803) 898-4123

Public Notice #14-095-PSD-TVAA   Date: October 08, 2014

NOTICE OF A DRAFT AIR PREVENTION OF SIGNIGICANT DETERIORATION CONSTRUCTION PERMIT

BP AMOCO CHEMICAL COMPANY (COOPER RIVER PLANT)
1306 AMOCO DRIVE
WANDO, SOUTH CAROLINA
(BERKELEY COUNTY / LOW COUNTRY CHARLESTON EQC OFFICE)
AIR PERMIT NO. 0420-0029-CU

BP Amoco Chemical Company (BPCR) has applied to the SC DHEC, BAQ, for a Prevention of Significant Deterioration (PSD) air construction permit to modify existing equipment at its Cooper River Plant. Preliminary Determination, draft construction permit, and Statement of Basis have been written by the BAQ outlining this proposed project and applicable regulations. In addition to other state and federal air quality regulations, the draft permit is subject to review under SC DHEC Regulation 61-62.5, Standard No. 7 "Prevention of Significant Deterioration (PSD)." This regulation is equivalent to Title 40 of the Code of Federal Regulations, Part 52.21 "Prevention of Significant Deterioration of Air Quality." Under these regulations, a facility must demonstrate that it will not significantly deteriorate the air quality in its region prior to constructing or modifying sources of air pollutants. The draft permit has not yet been approved and is open to comment from the public, the United States Environmental Protection Agency (EPA), the Federal Land Managers, the chief executives of Berkeley and Charleston Counties and the Berkeley-Charleston-Dorchester Council of Government.

BPCR produces only Purified Terephthalic Acid (PTA). PTA is used to make polyester fibers and films. The facility is proposing to modify the #1 and #2 Oxidation (OX) Units to remove limitations that prevent the units from operating at their unit design capacities (debottlenecking); and to make minor modifications to the #1 and #2 PTA Units to reduce operating costs. Emissions generated by this facility will include Particulate Matter (PM), PM less than 10 Micrometers in Diameter, Sulfur Dioxide, Nitrogen Oxides, Carbon Monoxide (CO), Volatile Organic Compounds (VOC) and Hazardous Air Pollutants. This project is removing several VOC and CO synthetic minor(SM) PSD avoidance limits for units affected by this project, and including the VOC and CO emissions from these units in the BACT Analysis. No other SM limits are being changed, and facility will continue to comply with those SM limits. Air dispersion modeling has indicated that the release of emissions from this facility will not cause or contribute to an exceedance of the National Ambient Air Quality Standards (NAAQS). The maximum degrees of Class II PSD increment consumption resulting from the proposed project are predicted to be: PM10, 24-hour increment: 20%; PM10, Annual increment: 6% SO2, 3-hour increment: 14%, 24-hour increment: 27% and Annual increment: 0%; NO2, Annual increment: 16%.

This construction permit will be incorporated as an administrative amendment into the existing TV permit with no additional public comment period, provided all public participation and EPA requirements were fulfilled with notice of the construction permit action. The status regarding EPA's review of the proposed permit and the deadline for a citizen petition is available on EPA's website at: www.epa.gov/region4/air/permits/proposed_index.htm. All emissions limitations and conditions in the draft PSD construction permit have been written in accordance with the SC Title V Operating Permit Program.

Interested persons may review the materials drafted and maintained by DHEC for this facility and submit written comments on the draft permit by 5:00p.m., on November 06, 2014, to James Robinson at the above DHEC address or by e-mail at robinsjc@dhec.sc.gov. All comments received by 5:00p.m, on November 06, 2014, will be considered when making a decision to approve, disapprove, or modify the draft permit. Where there is a significant amount of public interest, DHEC may hold a public hearing to receive additional comments. Public hearing requests should be made in writing to James Robinson at the above DHEC address or by e-mail. If a public hearing is requested and scheduled, notice will be given in this newspaper thirty (30) days in advance. If you have questions concerning the draft permit, please contact James Robinson at the phone number listed above. A final review request (appeal) may be filed after a permit decision has been made. Information regarding final review procedures is available from DHEC's legal office at the above address or by calling (803) 898-3350. Information relative to the draft permit will be made available for review through November 06, 2014, at the DHEC Columbia Office listed above and at the following location:

SC DHEC, Low Country, Charleston EQC Office, 1362 McMillian Ave Ste 300, Charleston, SC 29405 at (843) 953-0150

Information on permit decisions and hearing procedures is available by contacting DHEC at either address listed above. Copies of a draft permit or other related documents may be requested in writing at a $.25 per page charge. Please bring this notice to the attention of persons you know will be interested in this matter.

This public notice along with the Preliminary Determination which includes the draft permit and Statement of Basis may be viewed through November 6, 2014 on DHEC's website at: http://www.scdhec.gov/PublicNotices/